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3-8-8 The U. S. Department of Agriculture and the North Carolina State College of Agriculture recommend a fertilizer containing 6 to 10% potash for bright tobacco.

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3-8-8 Fertilizer containing too much nitrogen produces rough, bony tobacco. Avoid this by selecting a fertilizer mixture in which the nitrogen has been well-balanced with plenty of potash.

3-8-8 3-8-8 TOBACCO FERTILIZER gives best results with closer rows, closer spacing, ridge cultivation and late topping. Set more plants per acre and top after about half the crop is gathered.

3-8-8 3-8-8 TOBACCO FERTILIZER holds the tobacco on the hill after it matures, without burning, producing a thin, grainy leaf with "high-dollar" quality.

3-8-8 Remember that 800 pounds of 3-8-8 usually costs less than 1,000 pounds of 3-8-3, yet 800 pounds of 3-8-8 contains more actual plant food and is a much better balanced fertilizer.

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Better Crops with PLANT FOOD

The Whole Truth — Not Selected Truth

R. H. STINCHFIELD, *Managing Editor* SID NOBLE, *Editor*
Editorial Offices: 19 West 44th Street, New York

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Agricultural and Scientific Bureau
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A FOCUS FOR A YOUNG MAN'S FANCY

Better Crops with PLANT FOOD

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Say it and mean it —

"Go *to* Grass"

By Jeff McDermid

WHY is it that in the common parlance of America the phrase "go to grass" has become a symbol for a sort of decadence, a shiftless let-go policy, or a dull reversion to type?

Maybe it's the hill-billy idea; perhaps it's because half of the so-called wild grass land of our country is mesquite, sage, wire grass, scrub and desert growth. Perhaps it's because one can let grass grow after a fashion without so much tramping hither and yon over and over the acres to coax up a crop—like much farming was conducted before Jethro Tull "invented" his horse-hoeing husbandry.

Yet after all I suspect that we have so long regarded grass as a free gift of the gods of nature that it denotes trying to resign from active partnership when mankind is content to put his holdings into meadow or pasture.

You probably recall the story about the plains Indian who slid off his pony to observe a squatter breaking the tough Montana sod. Pointing to the antelope and bison herds in the distance, the ignorant old aborigine grunted, "Huh, white man put wrong side up!" This remark greatly amused

the ambitious settler, whose anxious descendants have since borrowed countless sums to stave off the effects of drought. It only added one more bit of evidence, according to the farmer, that only simple minds would "go to grass."

AS long as this nation was in debt to the Old World and had room for expansion and huge export trade, the wisdom of the founders of agriculture pointed with unerring logic to the fact that as a rule a rotation of cultivated crops with grain and hay produced fifty per cent more nutrients to fatten livestock or to produce wool and milk than the same area allowed to "go to grass." Labor counted for little and so it became gospel to speed the plow over the prairies and drain the marshes. What small portions there were left to grass consisted of the rough and wooded sections, where snags and stones discouraged the ardor of the adventurers.

It seems a far cry indeed from ad valorem tariffs or lists of import and export balances, or nationalism versus internationalism to the proper seeding, fertilizing, and stocking of *Poa pratensis* and *Trifolium repens,* otherwise known as Kentucky bluegrass and white clover. Our fathers would have taken anyone to the bug-house who mixed up such terribly unrelated things in their day.

BUT we have since learned that many things are related in strange ways and intermixed in confusing combinations which seem as opposite as the poles. Such, for instance, as the nitrogen in explosives and the nitrogen that may help grow the feed to make a juicy bullock to serve at a peace conference banquet.

Efficiency in agriculture has been spelled in terms of hustle and full plant capacity for so long that anyone who talks less intensity of operation is rated with the Indian. But diminishing returns may catch up with the zealous ones who insist on planting high-yielding crops on every available acre. It is not so big a piece of heresy as imagined to suggest that a general shift toward hay and pasture and to soil-improving crops would tend to build up farm incomes and restore the almost ruined farms in many states.

Those who claim this doctrine is "hogwash" might consider the "rainwash," and what it has done to us. Surveys taken in painstaking detail throughout the land by the Bureau of Chemistry and Soils reveal a system of private mismanagement that smells like a public scandal. It never gets the front page with the kidnappers, but it is a serious charge against the men who have been entrusted with the basic wealth of the nation. They brag loudly about it in conventions, but this same foundation of American life known as farming and stock-raising exposes its seamy side in countless crevices, gullies and gashes left in the wake of soil robbing and mineral-food mining. Although most evident in areas of low natural fertility, the devastating effect of erosion on the better farm lands is less spectacular but no less ruthless and inexcusable.

AN area exceeding the total arable land in Japan, once cultivated in America, has been so horribly chopped into a mass of caves and gullies that nothing else compares with it except the shell fields of Flanders. The down rush of flood waters over the ungrassed slopes has carried gravel and debris and heaped it high on more than three million more acres of naturally fertile bottom lands. Wide and trickling sheets of freshet water have likewise slowly stripped the best plant food from thousands of acres of upland topsoil.

Plenty of land once consisting of productive mellow loams and sandy loams, easy to till and bursting with virgin fertility, have been changed by

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Feed Southern Crops According to Their Needs

By A. B. Bryan

Editor, Clemson Agricultural College of South Carolina

THE intelligent feeding of plants with fertilizer rations properly balanced to satisfy the particular hunger and needs of each crop is gaining full acceptance as a first principle in economic crop production. Hence the significance of new results from researches regarding fertilizers.

Among Southern research agencies the South Carolina Agricultural Experiment Station is outstanding for the timeliness and appropriateness of its studies in fertilization problems. Director H. W. Barre acts upon his awareness of the value of such studies in a state and section where commercial fertilizers play so big and so necessary a part in production; and Dr. H. P. Cooper, agronomist of the station and noted authority on soils and their ailments, is always keen to see and solve a hungry soil's needs.

Manganese-deficient oats, showing yellowing of leaves.

The present results of South Carolina studies in 1934 and several preceding years mean much to Southern farmers in particular and to farmers in general where soil types and conditions are comparable. Something of the results with potash and other plant-food elements in producing tobacco, cotton, grain, hay, and certain vegetables merits brief consideration in this article as having wide application.

Tobacco Is Fastidious

Growers of bright-leaf, flue-cured tobacco in the Southeastern states have a delicate fertilizer problem in their efforts to get good yields and to keep their bright tobacco bright. The tobacco fertilizer analyses found best in recent years are: (1) for heavy productive soils 3 per cent nitrogen, 10 per cent available phosphoric acid, and 6 per cent potash, applied 700 to 800 pounds per acre; (2) for light, less productive soils a 3-8-6 analysis, 800 to 1,000 pounds per acre.

Tests at South Carolina's Pee Dee Experiment Station in 1934 indicate the importance of a liberal supply of potash in the fertilizer mixture. The plots which received the normal supply of nitrogen and phosphoric acid, but no potash, showed the usual characteristic symptoms of potash hunger. The leaves were somewhat drawn and rough, showing mottled discolorations and coppery specks at the tips and around the margins. The leaves curved downward towards the underside. The specks later enlarged, forming dead areas between the veins and giving the plant a rusty brown appearance. In practically all cases where potash was left out or the supply in the mixture was limited, the yield was reduced and the quality of leaf was very poor.

One thousand pounds per acre of a 3-8-9, with two per cent of the potash derived from muriate of potash and the balance from sulfate of potash, produced a good yield and a high grade of leaf during the 1934 season. Higher rates of potash, such as the 3-8-15 and 3-8-21, at the same rate per acre and carrying the usual two per cent chlorine, did not produce as much of the red-colored leaf in the cured product as in previous years. This may have been due partly to the extremely dry weather during the growing season.

An interesting new light on fertilizing tobacco shows where fertilizer is best placed with reference to the tobacco plant. In some tests conducted last season fertilizer mixtures were applied separately by a combination transplanter and fertilizer distributor which makes it possible to apply the mixture at the desired distance to either the side of or underneath the root crown of the plant. The best stand of tobacco was obtained where the fertilizer was placed 2½ inches to the side of the root crown at the time of transplanting. The poorest stand resulted where the fertilizer was mixed with the soil around the plant. Mixtures placed directly below the root crown of the plant gave comparatively poor stands. The side placements not only resulted in better stands, but the plants grew off much faster and more evenly and uniformly than with any of the other placements.

Has Definite Dislikes

Another serious tobacco fertilizer problem is the injury to the color and quality of the product caused by the presence of too much chlorine and sulfur in the fertilizer mixtures.

Experimental data and practical experience are showing that while a small quantity of chlorine in the tobacco fertilizer increases the acre value of the crop, an excessive amount not only injures growth but reduces quality by producing a thick, brittle leaf which when cured becomes thin, saggy, and dull in color, and also produces an unfavorable effect on burning quality. Trial-and-error results indicate, and tobacco specialists and agronomists therefore recommend, that fertilizer mixtures should con-

tain not over two per cent of chlorine.

So too with sulfur, results show that maturity of the crop is delayed and color of leaves is too red when there is much sulfur in the fertilizer. Hence the advice that fertilizers be formulated to contain a minimum of sulfur, preferably by reducing the soluble sulfur compounds used in the fertilizers.

Left—A normal corn plant. Right—A corn plant showing typical potash-deficiency symptoms.

To control sand-drown, or magnesia hunger, it seems desirable to have in the fertilizers two per cent magnesia (MgO), half of which should be water-soluble or come from water-soluble materials.

Southern farmers have long known or thought they knew that the cotton plant wants a generous ration of a "complete fertilizer," which interpreted means "mixed goods" containing the three long-recognized plant-food elements—nitrogen, phosphorus, and potash. Common analyses have been 3-9-3, 4-8-4, and more recently more concentrated analyses. But there is more to it, they are learning, than just that, thanks to the inquisitive agronomists and soil specialists like Dr. H. P. Cooper. These men through their studies are throwing many side-lights on the subject of fertilizing cotton. Here are a few of these.

1—The recent trend in the use of cheap nitrogenous fertilizer materials has increased the acidity of some soils to the point where it is not possible to produce crops economically until the soil is limed. Previous to 1905 mixed fertilizers were non-acid; the average base equivalent was equal to 10 to 40 pounds of limestone per ton. At the present time the average equivalent acidity of mixed fertilizers is about 150 pounds of limestone per ton. The continued use of fertilizers with a high equivalent acidity has rendered much land totally unfit for the economical production of many important crops.

"In general," says Dr. Cooper regarding his studies of this matter, "high acidity in the gray Coastal Plains soils is not as serious as in the red Piedmont and Upper Coastal Plains soils. The possibility of successful growth of crops on gray Coastal Plains soil with a relatively high degree of acidity is very probably related to the relatively low content of manganese and iron which

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Courtesy Canadian Government Motion Picture Bureau, Ottawa

Barley is a profitable crop to grow either as a feed or cash crop. This shows a typical Ontario scene of a field of O.A.C. No. 21 barley.

Malting Barley

By Peter Stewart

Ex-secretary, Canadian Seed Growers' Association

THOSE of us who have stood behind the old-fashioned straw carrier all day long, at threshing time, know something of the feeling of unrest, not the economic kind, that came over one as scores of barley awns seeped down behind the red bandana handkerchief and became firmly embedded in the "gansey" undershirt. Fortunately the straw carrier has given place to the straw blower, and it seems as though even the saw-toothed barley awns themselves will go the way of the woolen undershirt. Plant breeders are finding ways of growing barley with smooth awns.

For many years Ontario barley was used almost entirely for the feeding of livestock, and even at the present time about four-fifths of the barley produced in Ontario finds its way to the feed bin. This is as it should be, for barley outyields any other cereal in digestible nutrients per acre.

But of late years more and more barley is being used in industry. Breakfast foods, tonics, invalid preparations, bread, biscuits, confectionery, infant foods, food preservatives, and numerous other products are based on barley. These highly refined commercial preparations made from barley require a specially high-grade grain to begin with; containing high starch content

from well-matured kernels.

The first step in the manufacture of most barley products for human use is the conversion of the barley into malt. In this process, the barley is first cleaned carefully to remove grain impurities, weed seeds, and inert matter. After cleaning comes steeping. The barley is placed in large cisterns in running water and allowed to remain there for two or three days. From the steep cisterns the grain is conveyed to the germinating compartments where ideal conditions for growth are provided. After germination has proceeded sufficiently in the compartments, the sprouted barley is elevated to the kilns where it is thoroughly dried and cured. Following kilning it is again screened to remove loose sprouts and rootlets.

In appearance, barley malt resembles barley very much because the outer covering of the original barley kernel is not changed to any extent by the malting process. The endosperm, however, is changed by malting in as much as the starch becomes friable and can be easily crushed into a white floury mass without breaking up the husk. Hence the main purpose of malting is to produce from the barley the greatest possible value of starch in a free or "tender" physical condition.

Probably no cereal requires the exercise of greater care and judgment in its production than barley intended for malting. Such factors as variety, soil, time of seeding, fertilizing, and harvesting all are important. Fortunately our plant breeders have solved the question of variety, for the well-known O. A. C. No. 21, a six-rowed type originating at the Ontario Agricultural College leaves little to be desired either for feeding or malting purposes.

The best types of soil for barley production are fairly clearly defined. Clay loams and the heavier types of

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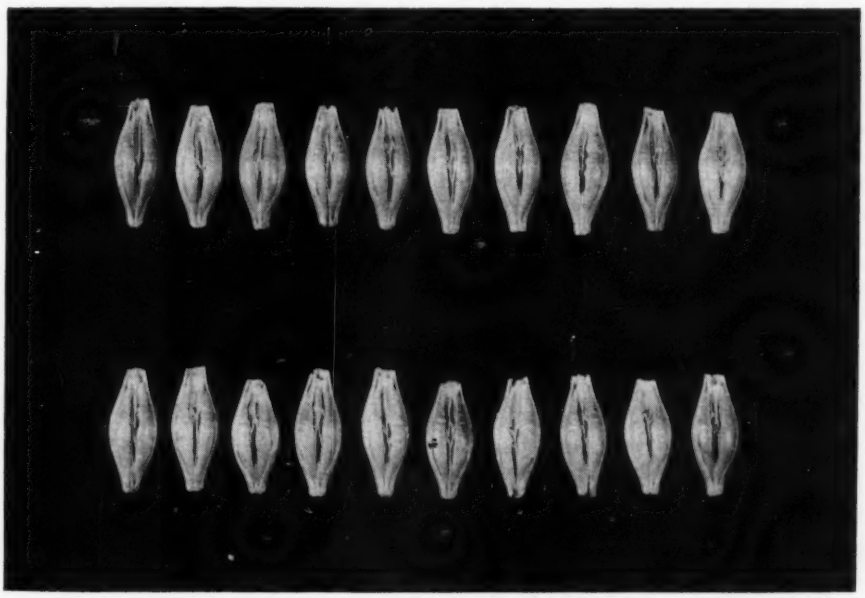


Courtesy Canadian Government Motion Picture Bureau, Ottawa

This is a sample of the exhibit of malting barley which won the gold medal and $500 award for Donald Scott of Cityview, Ontario, at the Royal Winter Fair, 1934. This barley is plump and thoroughly ripened; it has a strong husk of good adherence and is free from mechanical injury or unsoundness of any kind.

The Inquiring Mind *and the* Seeing Eye

By Dr. A. S. Alexander

University of Wisconsin

"IF you make a study of chemistry, and stick to it, you will be able to do *something* some day that no one has ever done before."

So said Dr. F. J. Alway, Chief of the Division of Soils of the University of Minnesota, to Dr. Ross Aikin Gortner, many years ago, when the latter noted scientist was a student under him at Nebraska Wesleyan University. Today, both of them are still looking for that mysterious "something" in their laboratories, less than one hundred yards apart on the Minnesota Campus at St. Paul, where each has accomplished wonders in his chosen field of effort.

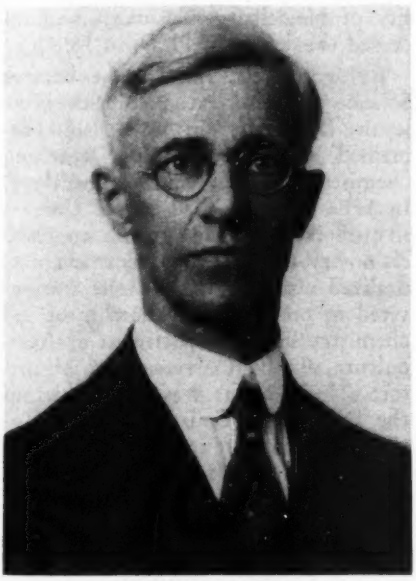
Dr. Alway has been and is a veritable missionary of science in the wide-open spaces of Minnesota, and is regarded as a guide, philosopher, and friend by the farm folk of that northern land. To him they have brought their problems, confident that he would solve them in a masterly way and give them advice that was not merely theoretical, but based upon a thorough study of the question involved and long practical experience with the various phases of agriculture in the different sections of the state.

Eminently conservative, he has been cautious, careful, and circumspect in the opinions he has expressed, and in the counsel he has given in person, on the platform, and in his voluminous writings. It has not satisfied him to give what might be termed wholesale instructions for the proper farming of a given area of land. Although he is personally acquainted with every district of Minnesota in a practical way, and bases his instructions on an intimate knowledge of the general and specific conditions in each of them, he prefers to tell the inquiring farmer to try out the suggested plan of working and fertilizing his land on a small scale and then apply it extensively if he finds it successful. Whether the farmer is located on rich mineral soil, sandy land, or peat, he has found that he will be safe in asking Dr. Alway to prescribe the best methods of dealing with crop production on each of them and without danger of making a lavish expenditure of time, effort, and capital at a possible loss. "Try my plan on 5 or 10 acres," Dr. Alway tells the farmer, "and see what the results are before spending money for fertilizers for a larger acreage."

A Great Teacher

William Paul Kirkwood, editor of publications and professor of journalism at the University of Minnesota, to whom we are indebted for particulars about the life and work of Dr. Alway, considers the scientist a marvelous teacher and says: "When he gets up before a group of farmers to talk to

them about their soils, he wins their confidence at once by a friendly and gracious good humor and an evident knowledge of what he is talking about. He attempts to tell nothing without *knowing* the facts. Then, he has a wonderful faculty for putting things simply and talks to the farmers in their own language. The result is, they like him, they believe in him, and they follow his instructions; then, getting results from his advice, they become enthusiastic 'boosters' for him and his work."



DR. F. J. ALWAY

We admire the conscientious and canny way in which Dr. Alway deals with every vital problem of soil management in Minnesota. His conservatism is well illustrated by his advice relative to the handling of the peat soils which occupy about one-eighth of the surface of Minesota, or approximately 7,000,000 acres. He does not tell the owners to undertake at once the drainage of this immense area of land, spend millions of capital in the work and more in the application of lime, commercial fertilizers, or farmyard manure. On the contrary he cautions all concerned to "make haste slowly." In his opinion it will, in general, be the wise method of procedure for those men already living upon farms which have more or less peat land, either already provided with or convenient to outlets, to try out the complete reclamation of but a few unprofitable acres, making use of modern methods. So far as the greater portion of the immense peat acreage is concerned, he thinks that at the present time the profit of reclamation is to be regarded as extremely doubtful even under the most skilled supervision and with every resource and faculty of conducting the work economically, while many extensive tracts could be improved only at a loss. When immediate reclamation is not proposed, it would, in his opinion, be better to leave the grass-covered bogs to serve as wire-grass meadows, or to drain them just enough to allow cutting of wild hay.

A Wide Territory

In Minnesota, Dr. Alway has had to make himself intimately acquainted with the various soils of 84,682 square miles of territory—a field 400 miles long and 354 miles wide. Driving an automobile, at what some folk would deem a reckless speed over hard-surfaced roads and, anon, crawling slowly over rough trails by lakes and streams, through dense forests and desolate tracts of cut-over and rocky land, and now and then wallowing, staggering, and skidding "in low" on the wet, slippery, red clay of some newly worked or improved (?) highway with a water-filled ditch menacing on either hand, he has visited and scrutinized practically every acre of the Gopher State. Soils, everywhere, have had to be tested for acidity; fertilizer needs have had to be determined and thousands of soil samples obtained for analysis. Drainage problems on all kinds of peat and marsh land have had to be studied *in situ*, and inquiring settlers and farmers interviewed and counselled.

It has been a trying life for the

good Doctor and has taken its toll of his strength, tried his nerves, strained his eyes and many a time threatened exhaustion; but ever this indomitable servant of science and the people has continued his work, rendered practical and scientific assistance to the farming community, and satisfied everyone—but himself—with the results of his endeavors. An evidence of the thoroughness and correctness of his investigations is the fact that his soil surveys have been accepted as the model for similar work undertaken by the United States Department of Agriculture.

Versed in Many Sciences

"One science only," said Pope, "will one genius fit." But Dr. Alway has not restricted his researches to the soil alone. His contributions to other phases of chemical science have been innumerable and important. In his time he has taught geology and mineralogy, and his investigations have carried him into the fields of nitrocompounds; hydroxylamins and nitrose compounds; phosphorus and sulphur contents of plants; inoculation for leguminous plants; flour bleaching; the strength of wheat flour; occurrence of prussic acid in sorghums and maize; losses from cornstalk disease; relation of the breaking of hog bones to the composition of ash; protein content of reed canary grass; quantity and nutrient contents of pine-leaf litter; composition of the leaves of some forest trees; agricultural value of marl; amount and placement of fertilizers for cultivated crops; and a host of other related subjects.

Little wonder then that Professor Kirkwood has called Dr. Alway "an indefatigable worker and tireless researcher."

Frederick James Alway was born at Rockford, Norfolk county, Ontario, Canada, May 28, 1874, the son of Frederick and Rachel (Mason) Alway. He was reared on a farm. When he was four years old his parents moved to Vittoria, nearer Lake Erie, and there Frederick Junior attended the public schools until 12 years old; then he entered the high school at Simcoe, and was graduated four years later. At the age of 16 he went to the University of Toronto, expecting to register for the study of medicine. Instead, he became interested in chemistry and majored in that subject, taking courses in physics as his minor. He graduated with the degree of Bachelor of Arts in 1894, at the age of 20, and then did graduate work at the University of Heidelberg, Germany, and received the degree of Ph.D. in 1897.

Returning to America, he became Science professor at Nebraska Wesleyan University in 1898, and remained there until 1906, teaching chemistry, geology, and mineralogy. In 1906 he was called to the University of Nebraska at Lincoln to teach chemistry. In 1911 he became a naturalized citizen. In 1913 he was invited to take the professorship of soil chemistry in the Department of Agriculture of the University of Minnesota. In 1914 he was made chief of the Division of Soils in that institution and has occupied that position ever since. In 1898 he had married Eve Mary Cook of Delhi, Norfolk county, Ontario. They have five children: Filomena Erica is married and lives in Hibbing, Minnesota. Lazelle Martha is doing Y. W. C. A. work in Hibbing, and Leonore, physical education at the University of Nebraska. They are twins. Fredericka Jane is living at home in St. Paul, and Robert Hamilton is a student of medicine in the University of Minnesota.

Received Many Honors

Dr. Alway's services to chemistry and allied subjects have been recognized in various ways. The University of Toronto conferred upon him the degree of Doctor of Science in 1927 and had him enroll in its Golden Book which is restricted to its distinguished sons who have given signal service in the fields of arts, letters, and

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Pioneering *in* Corn

By C. T. Gregory

Purdue University Agricultural Extension Department

THIS is a story of two Tippecanoe County Indiana farmers, George Bailey and his son James, whose persistent pioneer spirit has led them away from the beaten paths on to success with corn. The father, with his walls covered with corn-show ribbons, coveted a gold medal, the officially recognized proof of his ability to raise 100 or more bushels of corn per acre on five acres. He left no stone unturned to accomplish his aim and in so doing he has revealed some corn facts that are valuable.

Thirty-three years ago the father cleared a field of unflooded bottom land along the south fork of the Wildcat Creek. It was corn land just like Tecumseh's tribe of Indians had always used for their corn fields only a few miles north of this spot until General Harrison introduced a corn-reduction program to them following the Battle of Tippecanoe. So George Bailey followed the practice of the Indians and planted corn among the stumps. But he kept on growing corn on this same field every year and each year he scalped both the corn and stover from this soil. Experience has led us to believe that the root-rot disease would have retaliated by cutting the yields of corn. That the Baileys found a way to overcome this trouble is proven by the official records of the Indiana Corn Growers' Association in the five-acre-yield contests.

In the drought year of 1930 the yield was 96 bushels per acre; in 1931 it dropped to 86 bushels; but in 1932 the yield came back to 105 bushels; 1933 it was 113.5 bushels; and in 1934, a relatively tough corn year, the Baileys produced 128.8 bushels per acre.

Mr. Bailey taking a basket of Hoosier Hybrid to feed the colts.

What does this mean? Have we been wrong in our ideas of the nature and destructiveness of the root rot? On the contrary, when we look into the explanation of these bumper yields, we find that it really proves two important facts concerning the control of this disease. First, a corn plant that is properly nourished will be stronger and will be able to successfully resist the attacks of root rot. Second, a well-adapted, vigorous strain of corn will outyield and produce better quality grain than poorly adapted strains.

Let's look at some of the facts as told by these men. About five years ago they complained to a representative of the Purdue Agricultural Experiment Station that their corn lodged badly. The stalks were weak and collapsed. An examination was made of the plants at that time and it was recommended that they increase the potash content of their fertilizer, notwithstanding the fact that they applied cow manure liberally each year. They changed from a 3-18-9 to an 0-20-20 used at the rate of 200 pounds in the drill row. The effects were immediately apparent. The stalks remained standing and the quality of the grain was improved.

For the past 15 years they have manured this land during the winter. During the past 10 years they have planted sweet clover in the standing corn after the last cultivation. Previous to that time they sowed rye after shocking the corn and still rely on it for winter cover when they fail to get a catch of sweet clover. Impressed by the appearance and size of the Reid Yellow Dent and its record of winnings at corn shows, they were purchasing prize-winning strains of this variety for seed. In order to mature the prize-winning Reid, they were compelled to plant it late in April or early in May in cold soils where seedling troubles cut heavily into their stands. They planted soon after the cover crop of rye or sweet clover was turned under, making it seem essential to them that they use nitrates in their fertilizer. On this rich bottom land this extra dash of nitrogen induced excessive suckering, but was not enough to help feed the grain. With this late-maturing, large-eared variety of Reid the percentage of barren stalks was always high and the yields never reached the coveted record of 100 bushels per acre.

In 1930 the Baileys decided to try some of the much-discussed hybrids. Since none were available in Indiana at that time, they bought expensive seed from out of state. The results were disappointing. The corn looked good at tasseling time, but broke over before harvest, and time and again they were compelled to check their five acres in the Reid variety. Ninety-six

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Even the dog is interested in checking up the 128-bushel yield of Hoosier Hybrid on Mr. Bailey's field this year.

Pasture Must Carry A Cow Per Acre

By Ford S. Prince

Agronomist, New Hampshire Agricultural Experiment Station

PASTURE that will carry a cow for each acre should be the aim of a dairyman when he starts on a program of pasture improvement. Land that has a lower carrying capacity than this will prove expensive for fertilizer, fencing, and oftentimes for brush removal. That the goal of a cow to the acre can be reached, making due allowances for the vagaries of the weather, has been abundantly demonstrated recently on many farms.

Controlled Grazing

In the worn and depleted pasture areas of the Northeast, this pasture utopia cannot be attained except where fertilizers are used under a system of management that controls the grazing. Controlled grazing means not allowing the cows the run of all of the pasture the whole time, but a division of the pasture area so that one definite section of the pasture will not be grazed more than a week or ten days each month. Grazing one part of the pasture a week or so at a time and resting it the remainder of the month will add much to the amount of feed produced there and at no cost except for the fencing involved.

Where this system of pasture management is practiced, together with fertilizers of the right type and amount, there is every reason to believe that more farmers will have the satisfaction of pasturing a cow to the acre, an end that should make their dairy farming operations more profitable.

To get enough grass from an acre to support a cow means approximately two tons of dry matter harvested, as the cow eats it, when the grass is young, tender, and nutritious. This means that the land must yield as much as when carrying a good hay crop. Not only must it yield at that rate, but the vegetation in the stand must be so mixed that growth will occur every month of the year. This will happen only under conditions of normal rainfall and on soils which are heavy enough to support a stand of pasture clover as well as grass. Unless the pasture soil meets this requirement, there will certainly be one month, perhaps more, in the July-August period when it will be necessary to supplement the permanent pasture with green feed or other crops grown especially for pasture.

Study Fertilizer Needs

Broadly speaking, pasture yields can be tripled with the judicious use of fertilizers. Under a system of annual top-dressing, land carrying a cow to three acres can be made to produce enough feed in the space of a single season to support a cow to the acre.

Pasture soils and stands vary con-

siderably in their response to the different elements and materials used for top-dressing purposes.

Where the stand is the determining element, the response is governed by whether grass or clover is more abundant. In fields where there is no wild white Dutch clover, or where it cannot be induced to grow by applications of fertilizer, the response for top-dressing will come mainly from nitrogen. It has, at least, in our New Hampshire tests. This means that the pasture season can be lengthened by getting the cows out earlier in the spring after top-dressing and that the flush will last a little longer in June and July. However, there will always be a short period in late July and August.

Two pastures answering this description were studied over a three-year period with the following average annual yields of dry matter:

Treatment	Yield Dry Matter 3-year Av.
LNPK	1583 lbs.
LPK	699 "
Nothing	466 "

While the yield was slightly better on the LPK plots than on the plots that had no fertilizer, the difference is so slight that it probably is not significant and would not be profitable. It should be thoroughly understood that although there was an excellent stand of grass in these two fields, no Dutch clover was produced on any of the plots during the three-year period. Pastures like this are common in many sections, but are not of the best order and cannot be made to produce high yields of pasture through the entire season except they be plowed, heavily manured, and reseeded. In these trials, limestone at the rate of 1½ tons per acre, 600 lbs. of 16% superphosphate, and 200 lbs. of muriate of potash, were applied but once during the three-year period, while the nitrogen, equal to 312 lbs. nitrate of soda, was applied annually.

Contrast with these two pastures two other fields where similar tests were carried out, but where the vegetation contained a good proportion of white Dutch clover. The average annual yields for the three treatments as noted for the grass pastures, with the fertilizer scale the same, were as follows:

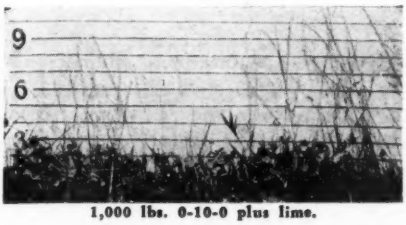
Treatment	Yield Dry Matter per A. 3-year Av.
LNPK	3225 lbs.
LPK	2632 "
Nothing	1229 "

In this case, the LPK treatment increased the yield over the untreated plots by 114%, whereas the increase for this treatment in the case of the grass pastures was but 50%. That the clover pastures were higher yielding is evidenced by the fact that the untreated portions gave more than double the dry matter yield of the untreated portions of the grass pastures. Furthermore, these clover pastures grew all through the season, especially where they were fertilized.

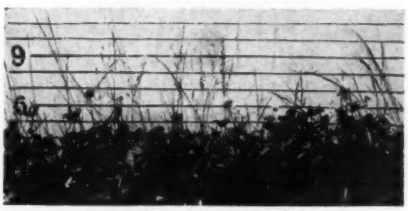
The response for phosphorus and potash on the clover pastures was not identical, a fact which indicates why some regions are justified in recommending superphosphate alone, or lime and superphosphate for pasture improvement, while in other regions potash must be added to the fertilizer for clover stimulation and perhaps for grass as well.

For example, in one of these pastures, the average annual increase for superphosphate alone was 920 lbs. of dry matter and for potash but 238 lbs., while in the other superphosphate gave a gain of 671 lbs. and for potash an increase of 672 lbs. was recorded. The latter response is more typical of results we have obtained in New Hampshire pastures, so that we do not feel justified in recommending superphosphate alone for pasture improvement. It usually takes a combination of the two for effective results.

The responses for lime that have been obtained in our tests which cover pastures in every county in our state are somewhat conflicting. Usually a small increase is obtained for broadcasting lime on the sod, a response that would doubtless be magnified if the lime could be worked into the soil. We are rather firmly convinced that in top-dressing old pastures the superphosphate, potash, and nitrogen requirements should be taken care of



1,000 lbs. 0-10-0 plus lime.



1,000 lbs. 0-10-10 plus lime.

1,000 lbs. 5-10-10 plus lime.

first, where funds are limited. Liming can be undertaken when some profits have accrued from the other treatments.

Potash and superphosphate needs are even more strongly indicated in the Connecticut Valley area where a severe potash deficiency exists for practically all crops. In an elaborate test near Claremont, N. H., nitrogen alone does not increase grass yields nearly so much as in other sections of the state, and maximum results are obtained only when high-potash, complete fertilizers are used. The yields per acre, both for dry matter and protein, illustrate this point.

Treatment	2-year Average Yield, Dry Matter	Yield, Protein
N	2019 lbs.	420 lbs.
NPK	3640 "	596 "
PK	2193 "	520 "
Nothing ..	1576 "	264 "

In this case, N alone is an average of five different nitrogen carriers, NPK is equal to 500 lbs. of a 10-20-20 fertilizer, and PK is 500 lbs. of an 0-20-20 fertilizer, all applied annually.

The protein yields are inserted here because in most cases dry matter yields do not tell the whole story. The composition of the grass is strongly affected by fertilizer treatments. On this pasture, the PK treatment analyzed highest with an average of 23.71%, N second with 20.8%, while the protein content of the NPK and untreated plots was 16.37% and 16.76% respectively.

Encourage Clover

The PK plot in this test was an interesting study. During early spring and summer it yielded no more than the untreated sections, but in midsummer the clover began to grow, appeared to get thicker, and the heaviest yields came in August and September, at a time when forage is usually most needed. This so often has proved the case in our trials that we believe the encouragement of Dutch clover in pastures where it will grow is of paramount importance. On many farms, where Dutch clover abounds and where there is already enough growth to support the dairy herd during May and June, attention to the clover by fertilizing with a phosphorus-potash mixture is all that is necessary to complete the pasture picture.

We have analyzed the results that

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Wicomico County Leads *in* Cucumbers

By George R. Cobb

Salisbury, Maryland

THE aim of cucumber growers is to develop a fruit of the proper size, shape, and color, and in addition a fruit that will stand up well in hot weather and under shipping conditions.

That Maryland growers are achieving this aim is evidenced by the fact that out of approximately 8,180 carloads of cucumbers grown and shipped in the United States annually, 692 cars are shipped from the State of Maryland. Of these 692 cars, about 84%, or 582 cars, are grown and shipped from one county, Wicomico. In November 1933 several of the local newspapers carried stories with prominent headlines to the effect that "Wicomico County Leads United States in Cukes." Subheads further amplified the statement with the words: "Ranks First in Acreage and Production, According to Government Report."

Years of Experience

During the past 40 years that farmers in this section have been growing this crop, many cultural practices necessary to producing large yields of high-quality cucumbers have been developed. The slicing cucumber, which is the demand of their market, must be shipped in a fresh and natural state. Based on the consensus of opinion of 15 buyers who purchase large quantities of these for commercial houses and large establishments in such cities as New York, Chicago, Pittsburg, Detroit, and Philadelphia, the ideal slicing cucumber must be a dark green color over all, straight from tip to tip, and a fruit that measures seven inches in length and seven inches around its largest circumference.

Can Produce Primes

One of the drawbacks in the production of a cucumber crop is that only a comparatively small percentage of the total fruits produced can be graded as marketable. There are too many "yellow bellies, pinched tips, crooked ends, etc," in practically every field, and these culls cut down the yield of saleable fruits and decrease returns from the crop. Weather conditions, it is true, may have a depressing influence upon not only the yield but the shape, size, and color of the fruit. However, too often under ideal weather conditions culls constitute more than 50% of the crop.

Maryland growers have gone far and are going farther toward increasing the percentage of primes. They have discovered that cucumbers are more tolerant to acidity than are cantaloupes, for example, and that too much nitrogen not only produces soft fruit but lessens pollination. The prevailing idea was that too much nitrogen produced excessive foliage and this prevented, to a great extent, pollination by winds and insects. However, one authority has recently suggested that excessive nitrogen develops an abundance of male blossoms.

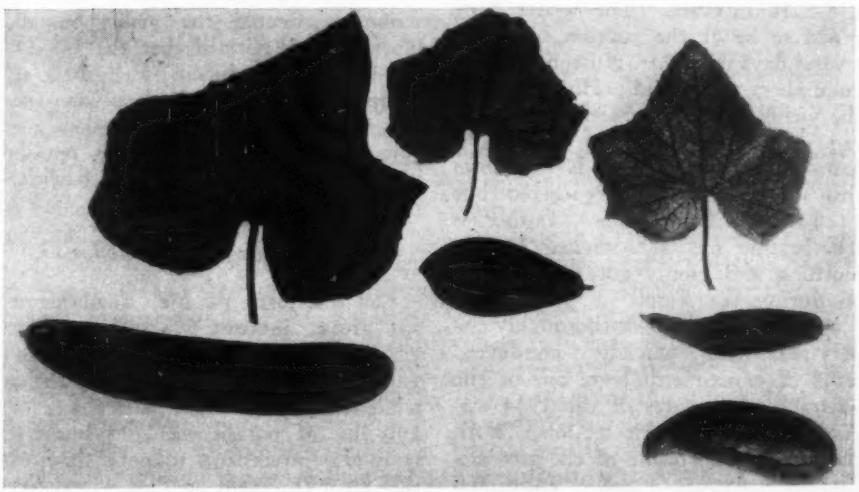
A standard practice among cucumber growers in Wicomico county until recently was to apply manure in the rows and from 600 to 800 pounds of a 4-8-4 fertilizer per acre. In 1928 G. Leroy Huston conducted experiments in which he compared 1,000 lbs. of 4-8-4 fertilizer with the same amount of the same analysis plus 200 lbs. of muriate of potash. The results were surprising and indicated very strongly that potash was doubtless a limiting factor in the production of cucumbers.

The yield from the 1,000 lbs. of 4-8-4 was 79 bushels per acre, whereas the plot that had the 200 lbs. of muriate of potash in addition to the regular application of fertilizer produced 109 bushels.

Although the greatly increased yield was striking and very profitable there were other features that showed the advantage of the additional potash. The fruits were of more uniform shape and size; the vines stood up longer, with less signs of disease and break-down; the fruits on the extra-potash plot were of a rich green color and retained this color for an extended period of time.

A member of one of the local fertilizer companies made several visits to these plots and on one trip he picked three average samples from each of the plots. These samples he placed in the rear of his car and carried them about with him on his many trips. In spite of the fact that very warm weather prevailed at the time, the fruits from the extra-potash plot retained their firmness for about three weeks while those fruits from the plot that did not receive the extra potash became soft within five days and started to decay within a week.

Another interesting experiment was conducted by C. M. Thompson in which an application of 800 lbs. of a 5-8-5 was compared with 1,500 lbs. of the same analysis. The comparative yields were 87 bushels from the plot receiving the 800-pound application and 129 bushels from the acre where 1,500 lbs of the 5-8-5 fertilizer were used.



The leaf and cucumber to the left were removed from a plant receiving complete fertilizer. The leaf is normal green and the fruit is well developed and of desirable shape and color.

In the middle, the leaf and fruit were removed from a plant receiving nitrogen and phosphorus only. The leaf shows the characteristic dying of the leaf margin indicating potash starvation. The fruit with enlarged tip end characterizes the result of deficient potash.

The leaf and cucumbers to the right are from plants lacking nitrogen. The leaf is yellow and the fruits have undeveloped tips.

In this experiment records were kept of the yield at each picking, and the results were very interesting. On July 8, for example, 19 bushels were gathered from the 1,500-pound plot, as compared with but 13½ bushels from the other plot; on the 10th of the same month the yields were 10 and 8 bushels; on the 12th the 1,500-pound plot yielded 12½ bushels and the 800-pound plot but 8½ bushels. Further records served to indicate that not only were 800 lbs. of a 5-8-5 fertilizer not enough to mature a good crop but that more plant food would result in more early maturity, which in some cases brought greater returns on the market.

Son Beats Father

In 1934 Luther Huston, a 4-H Club member, prepared and seeded a half acre of cucumbers, separate and distinct from his father's field. Mr. Huston, following the usual practice of the section, applied a 5-8-5 commercial fertilizer but Luther, knowing the value of potash on other crops he had helped grow, decided to use a 4-8-10 mixture. The writer happened to be at the auction block on several days when Mr. Huston brought cucumbers to be sold. His report on the yields secured from the two plots ran as follows: "Luther picked 34 hampers (bushels) from his 12 rows this morning, while I gathered but 11 hampers from mine. Luther is still beating me as he picked 24 this morning and I only got 13"; and so on during the season.

A carefully planned, thoroughly supervised, and officially conducted series of experiments were one of the outstanding features of the 1934 cucumber season in this section. With the hearty cooperation of the growers, County Agents, and Vocational "Ag" Teachers, these tests were as nearly official and unbiased as could be desired.

These tests were conducted on the farms of John Moore, Bridgeville, Delaware (Sussex County), Joseph Hill, Seaford, Delaware (Sussex County), and Willard Toadvine, Salisbury, Maryland (Wicomico County). In spite of a serious drought in lower Delaware, the comparative yields were conclusive and surely indicated that extra potash is needed to grow an optimum crop of cucumbers under the conditions of soil and climate in this section.

The experiment consisted of four plots on each farm. Plot 1 received 1,000 lbs. of a 5-8-5 commercial fertilizer mixture; Plot 2 the same amount of the 5-8-5 plus 200 lbs. of muriate of potash; Plot 3 had 1,000 lbs. of a 5-8-12 fertilizer; while Plot 4 had 1,000 lbs. of the 5-8-12 plus 200 lbs. of muriate of potash. In all other particulars the four plots were as uniform as possible in soil type, contour, cultural operations, and harvesting methods.

The records of yields on the farm of Mr. Moore show a steady increase as the potash was increased. Plot 1 produced 42 bushels; Plot 2, 54 bushels; Plot 3, 55 bushels; and Plot 4 gave a yield of 66 bushels. (It should be recalled that a drought seriously affected the yields on all plots.) It is noticed that the 5-8-12 combination produced 55 bushels as compared with 42 bushels on the 5-8-5 plot, or a gain of 13 bushels per acre. The 200 lbs. of extra potash increased yields 12 and 11 bushels, respectively.

The Story Continued

On the farm of Mr. Toadvine a still greater increase was shown. The yields on Plot 1 which received the 1,000 lbs. of 5-8-5 was 100 bushels, while the yield on Plot 2 with the extra 200 lbs. of potash was 124 bushels. It is also interesting to note that on this farm the yield on Plot 4 was the same as on Plot 2, i.e., 124 bushels, but Plot 3 only produced 96 bushels.

Total yields on the farm of Mr. Hill indicate that here again more potash resulted in a larger crop and

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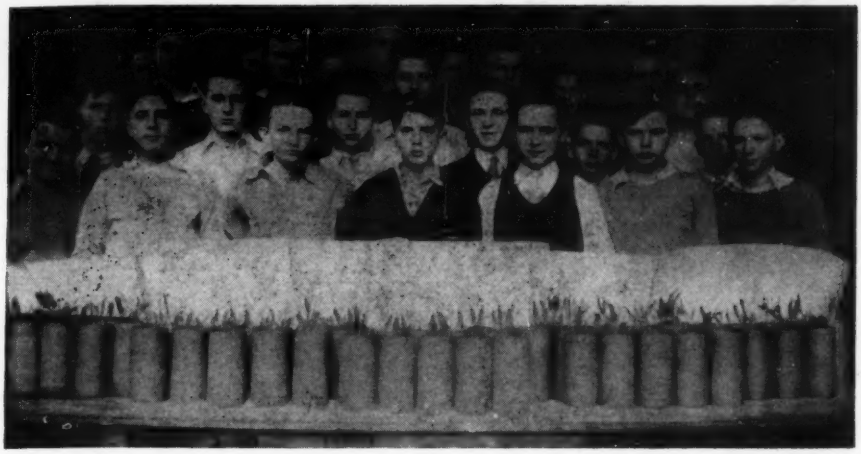

These boys can tell their fathers what fertilizers they need to apply on their farms.

Youthful Soilsmen

By Forest E. VanPelt

Vocational Teacher, Orland High School, Orland, Indiana

THE farmer who has a son studying soil fertility in a school teaching vocational agriculture has a simple and practical way to check up on his soils' needs. Through his boy he can gain the knowledge necessary to formulate a satisfactory fertilizer program.

With the beginning of the school year in September of 1934 the twenty-five boys enrolled in our vocational course were introduced to the idea of making an accurate map of the home farm. All of the boys knew within fairly accurate limits the size of the respective fields, as also did their fathers, but in only one case had accurate measurements ever been taken over the entire farm. It was easy for the boys to see a need for this work in view of certain local problems that had arisen because of faulty measurements of fields to comply with the Agricultural Adjustment Act.

Various means of measurement were devised by boys working in pairs or singly, and within two weeks' time the maps were completed with permanent tracing, legend, and scale. To provide space for fertility record, crops grown, and acre yields of previous years, a sketch of each field was prepared on smaller sheets and the complete history of fertilizer treatment, liming, manure application, crops grown, yield, etc. was recorded. The amount of this information varied widely between farms, but a start was made on all farms and the interest stimulated will result in more complete information as seasons come and go in the future.

While the weather was still fine in the fall, each boy took from three to five soil samples in each field and

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Potash Has Big Role in a Fertilizer Program

By Dr. R. E. Stephenson

Oregon State Agricultural College

POTASH long has been recognized as one of the major nutrients, ranking next to nitrogen in the quantity required to meet the needs of crop production. At the same time it is one of the most abundant of the mineral nutrients found in the soil. Faith in the efficacy of abundance has been responsible for the omission of potash in many fertilizer programs, sometimes no doubt when it could profitably have been included.

For several years phosphorus was the chief fertilizer recommended and used on any extensive scale in this country. While in theory legumes should supply nitrogen, in practice not nearly enough legumes were grown to supply sufficient nitrogen for satisfactory crop production. Stimulated by a reduction in the price, the consumption of nitrogen fertilizers has rapidly increased, until nearly equaling the consumption of phosphate. The relative consumption of potash has likewise considerably increased during the last several years, but the increase has hardly yet been sufficient to meet the real needs.

There is little doubt but that the use of both phosphorus and nitrogen should be still further extended, and as more of these elements are used, more potash should likewise be added. There are very few things in which a farmer may invest his money with as sure or as quick returns as in fertilizers, often with profits that are much larger than can be obtained in the business world.

Certain soil types are characteristically deficient in potash. Almost without exception peats need it. Many sands need it. The older, more exhausted, and badly leached soils are often seriously lacking in it. Certain geologic formations are sometimes associated with potash need. Thus the soils of geologic areas known as "coal measures" (formations where coal is likely to be found) are frequently needing this plant food.

"Hand in Hand"

Such deficient soils seldom need potash only. In fact potash has little chance to function to its full capacity in producing plant growth until other necessary nutrients including lime, superphosphate, and nitrogen are adequately supplied either naturally or by the use of a suitable form of fertilizer.

It is worth observing that with the increased consumption of nitrogen and phosphate fertilizers, and the resulting larger crop yields, the available

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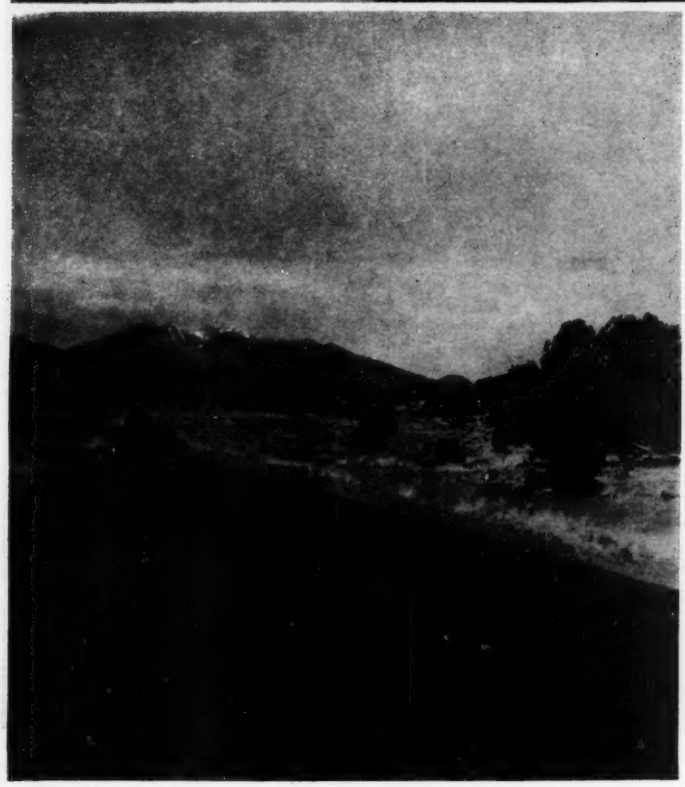
Pictorial

IT'S GOOD TO GET THE OLD BIKE OUT AGAIN.

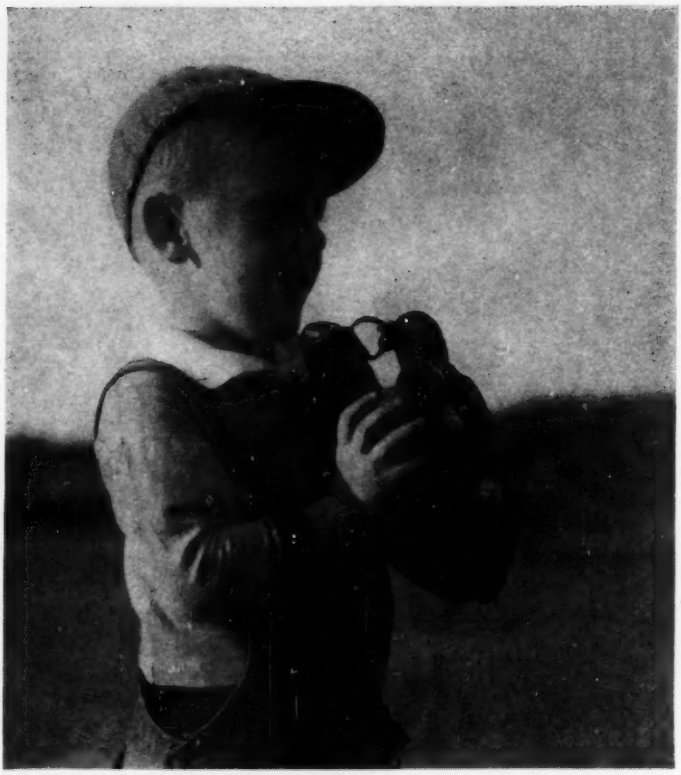


Above: Remains of the famous old corduroy road over the American Sahara desert a few miles north of Yuma, Arizona.

Left: The modern highway leading into the desert.

Right: The old church in the Pueblo Laguna Indian Village, Laguna, New Mexico.

Below: Pueblo Laguna Indian Village, Laguna, New Mexico.



Signs of Spring

The Editors Talk

Fertilizers and Farm Income

With the season for using fertilizers already begun in some states, it is encouraging that this Spring the farmer is in a much better position to buy fertilizers than he has been since 1930.

The "low" of the farmer's cash income occurred in 1932. His income increased in 1933 and again in 1934. According to O. C. Stine of the Bureau of Agricultural Economics, U.S.D.A., the farmer's cash income for 1934 will be about $6,200,000,000, or an increase of $1,830,000,000 or 42 per cent over 1932. Rental and benefit payments made material contribution to this increase. It also is noted that during 1930 to 1932 farm income was not sufficient to pay expenses but in the two years following, 1933 and 1934, the income was sufficient to pay expenses "and to return something to the operator for his management and capital. The income to farm operators from 1934 production, for labor, capital, and management, after paying expenses, probably would purchase about twice the quantity of the goods that could be bought by that for 1932."

It should be borne in mind, however, that this great improvement in purchasing power in the last two years is from the very low level. It is fortunate that from the latest data available fertilizer prices stand at 105% of normal —1910 to 1914 being considered the base—while the prices of all commodities used in farm production show an index of 131% of normal. In fact the price of fertilizers shows the smallest increase. The purchase of fertilizers out of the increased cash income is therefore one of the farmer's most profitable investments.

Whatever the methods of marketing and distribution, the problem of efficient and low cost production is always with us. As a factor in the solution of this problem, in many crop-producing areas, fertilizers play an important part. Then too, if the fertility of our soils is to be maintained, the proper use of the right fertilizers is very necessary. Too long a period with a low volume of fertilizer consumption is neither good for the farmer or our national agriculture.

Mr. Stine further notes that the position of the farmer also has been improved by the refinancing of debts and the establishment of Federal credit agencies for providing loans to farmers on the basis of liberal appraisals and comparatively low rates. The refinancing of debts and the reduction of interest charges have contributed toward restoring the farmers' credit and have thus increased their current purchasing power, as rapidly perhaps, if not more rapidly, than the actual current increase in income.

From the Farm Credit Administration comes the indication that the crisis in refinancing farm debts has passed, although the demand for loans still continues. From the same source comes the strong statement that "the ability of any farmer to repay loans in these times depends on the efficiency of his business. There is no profit for anyone in crops that are poorly managed."

Southern Agricultural Workers Meet

The rehabilitation of the farmer, agriculture under the New Deal, cotton production and export, and the control of erosion were some of the subjects, among many others, which were ably discussed at the Thirty-Sixth Annual Convention of the Association of Southern Agricultural Workers in Atlanta recently. The Convention was attended by some 650 members of the association, not only from all parts of the South, but from other sections of the country as well.

The Association of Southern Agricultural Workers is unique in that its membership includes all types of agricultural workers and its conventions afford a common meeting ground for all types of problems affecting Southern agriculture.

A large number of papers of vital interest were presented. Under the section on Agronomy, fertilizers occupied a prominent place. Important papers also were given in the sections devoted to crops, soils, animal husbandry, dairy science, home economics, horticulture, poultry, forestry, etc. Various societies held their meetings in conjunction with the Convention, among them the Southern Section of the American Society of Agricultural Engineers, the Cotton States Branch of the American Association of Economic Entomologists, and the Southern Division of the American Phytopathological Society.

In the sessions of the various groups problems affecting an efficient and economical crop production were discussed from different angles. Efficient production and the changing phases of such production have always taken a prominent place in the Association's program. The problem of finding an export market for cotton, the coordination of cotton research programs, and the possible increase in cotton production in other countries received a great deal of attention.

The Newer Emphasis

The newer emphasis at the present meeting might be summed up in rural rehabilitation, the relationship of the New Deal to agriculture, and a broad emphasis on the economic, social, and spiritual values of rural life in addition to the more purely scientific problems. Under these broad headings research and land planning, the ultimate effect of marketing agreements, present farm credit activities, and the ultimate effect on agriculture of the present monetary policy were included. Subsistence homesteads made another topic as did the obligation of the extension services and vocational teachers to agriculture.

The Extension Service, which originated in the South under the auspices of Dr. Seaman A. Knapp, held a two-day conference. The relationship of their work to present agricultural policies was discussed under such headings as the Integration of the AAA Program in the Regular Extension Program; Responsibility of Extension in Connection with Rehabilitation; Organization of Extension Forces for Soil Erosion Control; Budgeting Farm Needs on a Live-at-Home Basis; and Relocation of Stranded Families in Rural Areas.

Out of the convention came another indication that our national agriculture is changing in its viewpoint and emphasis. Research is needed as badly as ever, but the big problem of research now, in its broader aspects, would seem to be its relationship to a more equitable, controlled production and distribution, especially as they affect a sound development of both the economic and social values of rural life.

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

The form of the fertilizer may have an important influence on the results it will produce, according to work reported by R. C. Collison and J. D. Harlan in New York State Agricultural Experiment Station (Geneva) Bulletin 646, "Fertilizer Responses of Baldwin Apple Trees on an Acid Soil." The experiment reported was primarily a comparison of various nitrogen fertilizers, but the results obtained and certain modifications in treatments during the course of the work broadened the scope of the conclusions that could be drawn. The physiological or residual acidity or alkalinity of the fertilizer markedly influenced the yield and quality of the fruit. This was somewhat surprising, since apples are usually considered as being tolerant of rather wide ranges of soil acidity. The neutral or alkaline fertilizers were distinctly superior in yield and quality of fruit. However, when the acidic fertilizers had lime treatments compared with them, the results were about as good as those from most of the alkaline fertilizers.

Of the various fertilizer materials used, potassium nitrate applied alone gave outstandingly good yields and quality of fruit during the experiment. The authors could not give a satisfactory explanation for this as the treatments used in the experiment did not permit of direct comparisons. Since approximately the same amount of nitrogen was applied in the form of nitrate of soda, the superiority of nitrate of potash might be ascribed to the potash. However, complete fertilizers with smaller amounts of potash did not produce such good results. The authors seem inclined to feel that some peculiarity of combination of the nitrogen and potash in nitrate of potash, or the wide nitrogen-potash ratio of this fertilizer combined with its physiological neutrality, favored the assimilation of nitrogen or potash, or both by the tree, thus producing the favorable results obtained.

"Commercial Fertilizers—Report for 1934," *Agr. Exp. Sta., New Haven, Conn., Bul.* 365, *Oct.* 1934, *E. M. Bailey.*

"Tests for Phosphate, Nitrate and Soluble Nitrogen in Conducting Tissue of Tomato and Lettuce Plants, as Indicators of Availability and Yield," Agr. Exp. Sta., Lexington, Ky., Cir. 43, *Sep.* 1934, *E. M. Emmert.*

"Report of Analyses of Commercial Fertilizers," Dept. of Agr., Baton Rouge, La., Fer. Rept. Season 1933-1934, *Harry D. Wilson.*

"Commercial Fertilizers, 1934," *Agr. Exp. Sta., Orono, Me., Off. Inspect.* 153, *Oct.* 1934, *James M. Bartlett.*

"Fertilizer Analyses and Registrations, 1934," *Dept. of Agr., St. Paul, Minn., H. A. Halvorson.*

"Report of Analyses, Commercial Fertilizers and Fertilizer Materials, Seasons 1932-1933," *State Dept. of Agr., Jackson, Miss., Dr. W. F. Hand.*

"Analyses of Commercial Fertilizers, Fertilizer Supplies, and Home Mixtures for 1934," *Agr. Exp. Sta., New Brunswick, N. J., Bul.* 578, *Nov.* 1934, *Charles S. Cathcart.*

"Interpreting Fertilizer Analyses with Reference to the Sources of Nitrogen," Agr. Exp. Sta., New Brunswick, N. J., Cir. 331, *Sep.* 1934, *A. W. Blair.*

"Inspection of Fertilizers," R. I. State College, Kingston, R. I., Ann. Fer. Cir., Sep. 1934, *W. L. Adams, and A. S. Knowles, Jr.*

"Cell Size and Structure in Plants as Affected by Various Inorganic Elements," Agr. Exp. Sta., Burlington, Vt., Bul. 383, *Sep.*

1934, *B. F. Lutman.*

"The Relation of Fertilizers to the Control of Cotton Root Rot in Texas," U. S. D. A., *Washington, D. C., Tech. Bul. 426, Aug. 1934, H. V. Jordan, P. R. Dawson, J. J. Skinner, and J. H. Hunter.*

"Experiments with Nitrogen Fertilizers on Cotton Soils," U. S. D. A., *Washington, D. C., Tech. Bul. 452, Oct. 1934, J. J. Skinner, R. A. Lineberry, J. E. Adams, C. B. Williams, and H. B. Mann.*

"A Review of the Patents and Literature on the Manufacture of Potassium Nitrate with Notes on Its Occurence and Uses," U. S. D. A., *Washington, D. C., Misc. Pub. 192, July 1934, Colin W. Whittaker and Frank O. Lundstrom.*

Soils

"Measuring Soil Fertility," Agr. Exp. Sta., New Brunswick, N. J., Cir. 335, Nov. 1934, A. W. Blair.

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"About Soil Testing," Agr. Exp. Sta., Logan, Utah, Leaf. 12, Mar. 1934, D. W. Pittman.

"Orchard Soil Management," Agr. Exp. Sta., Logan, Utah, Leaf. 29, Mar. 1934, Francis M. Coe.

"Application of Steam in the Sterilization of Soils," U. S. D. A., *Washington, D. C., Tech. Bul. 443, Aug. 1934, Arthur H. Senner.*

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"Soil Survey of Poweshiek County, Iowa," U. S. D. A., *Washington, D. C., Series 1929, No. 29, T. H. Benton and A. E. Shearin.*

"Soil Survey of St. Clair County, Michigan," U. S. D. A., *Washington, D. C., Series 1929, No. 27, E. B. Deeter, H. W. Fulton, B. E. Musgrave, and L. C. Kapp.*

"Soil Survey of Hennepin County, Minnesota," U. S. D. A., *Washington, D. C., Series 1929, No. 24, P. R. McMiller, C. C. Nikiforoff, E. A. Fieger, Sam Hill, C. H. Mattson, G. A. Swenson, and W. C. Boatright.*

Crops

Spring will soon be upon us and already farmers are making their plans for the new growing season. To the countless home-owners whose enthusiasm in that direction is limited to a lawn or garden, the care of these small plots becomes a timely topic. A new Extension Bulletin No. 296, "Lawns —Construction and Maintenance," by R. W. Curtis and J. A. DeFrance, of the New York State College of Agriculture, will find its way to many of these interested people. That this publication will be of great help is guaranteed by its many suggestions for success in acquiring an attractive setting for the home.

"Alfalfa in Ohio," Bulletin 540 by C. J. Willard, L. E. Thatcher, and J. S. Cutler of the Ohio Agricultural Experiment Station, is this commonwealth's latest presentation of its experimental work and observations on this important crop. The bulletin discusses all factors involved in success with alfalfa, and with carefully tabulated data and a great many pictures, should set on the right track growers who would seek profit from this valuable legume.

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"Control of Cotton Insects and Diseases," Agr. Exp. Sta., Auburn, Ala., Leaf. 10, July 1934.

"The Fall Crop of Irish Potatoes," Agr. Exp. Sta., Auburn, Ala., Leaf. 11, Oct. 1934.

"Care and Pruning of Ornamental Shrubs," Agr. Exp. Sta., Auburn, Ala., Leaf. 12, Oct. 1934.

"Improving the Uniformity of Cotton Fiber by the Use of the Pressley Sorter," Agr. Exp. Sta., Tucson, Ariz., Tech. Bul. 54, Nov. 15, 1934, E. H. Pressley.

"Forty-sixth Annual Report, Fiscal Year Ending June 30, 1934," Agr. Exp. Sta., Fayetteville, Ark., Bul. 312, Nov. 1934, Dan T. Gray, E. B. Whitaker, G. W. Ware, and G. H. Banks.

"Forcing Gladiolus Outdoors by Heating the Soil with Electricity," Agr. Exp. Sta., Berkeley, Calif., Bul. 584, Oct. 1934, James R. Tavernetti and S. L. Emsweller.

"Electric Heat for Propagating and Growing Plants," Agr. Exp. Sta., Berkeley, Calif., Cir. 335, Aug. 1934, B. D. Moses and James R. Tavernetti.

"The Forty-seventh Annual Report of The Colorado Agricultural Experiment Station, Fiscal Year 1933-34," Agr. Exp. Sta., Fort Collins, Colo., E. P. Sandsten.

"Avocado Production in Florida," Agr. Exp. Sta., Gainesville, Fla., Bul. 272, Oct. 1934, H. S. Wolfe, L. R. Toy and Arthur L. Stahl.

"Fourteenth Annual Report 1933-1934," *Ga. Coastal Plain Exp. Sta., Tifton, Ga., Bul.* 24, *June* 1934, *S. H. Starr.*

"Physiologic Factors Affecting the Germination of Seed Corn," Agr. Exp. Sta., Ames, Iowa, Res. Bul. 176, *Oct.* 1934, *Joe L. Robinson.*

"Collards—A Truck Crop for Louisiana," Agr. Exp. Sta., Baton Rouge, La., La. Bul. 258, *Oct.* 1934, *Julian C. Miller.*

"The Forty-seventh Annual Report of the University of Maryland 1933-1934," *Agr. Exp. Sta., College Park, Md., H. J. Patterson.*

"Raspberry Growing in Michigan," Agr. Exp. Sta., East Lansing, Mich., Cir. Bul. 152, *Oct.* 1934, *R. E. Loree.*

"The Quarterly Bulletin," Agr. Exp. Sta., East Lansing, Mich., Vol. 17, *No.* 2, *Nov.* 1934.

"The Cultivation of the Highbush Blueberry," Agr. Exp. Sta., East Lansing, Mich., Spec. Bul. 252, *Oct.* 1934, *Stanley Johnston.*

"The Composition, Quantity, and Physiological Significance of Gases in Tree Stems," Agr. Exp. Sta., Univ. Farm, St. Paul, Minn., Tech. Bul. 99, *May* 1934, *Warren William Chase.*

"Work of the Agricultural Experiment Station—The Report of the Director for the Year Ending June 30, 1933," *Agr. Exp. Sta., Columbia, Mo., Bul.* 340, *Sep.* 1934, *F. B. Mumford and S. B. Shirky.*

"Adapted Red Clover for New Jersey," Agr. Exp. Sta., New Brunswick, N. J., Cir. 330, *Sep.* 1934, *Howard B. Sprague.*

"Cucumber Growing in New York," Agr. Exp. Sta., Geneva, N. Y., Cir. 150, *Aug.* 1, 1934, *W. D. Enzie.*

"Muskmelon Growing in New York," Agr. Exp. Sta., Geneva, N. Y., Cir. 151, *Sep.* 1, 1934, *W. D. Enzie.*

"Cauliflower and Sprouting Broccoli," Agr. Exp. Sta., Geneva, N. Y., Cir. 152, *Sep.* 1, 1934, *W. D. Enzie.*

"Raspberry Growing in New York," Agr. Exp. Sta., Geneva, N. Y., Cir. 153, *Oct.* 1, 1934, *G. L. Slate and W. H. Rankin.*

"Vegetable-Crop Production in Suffolk and Nassau Counties," Agr. Exp. Sta., Ithaca, N. Y., Bul. 611, *June* 1934, *F. O. Underwood.*

"Growing Wood as a Crop on New York Farms—Part 2*—Care and Culture," Agr. Exp. Sta., Ithaca, N. Y., Ext. Bul.* 291, *June* 1934, *J. A. Cope.*

"Twenty Years of Management of the Cornell University Woodlots," Agr. Exp. Sta., Ithaca, N. Y., Ext. Bul. 292, *A. B. Recknagel.*

"Factors Affecting the Development of the Cotyledonary Buds of the Common Bean, Phaseolus Vulgaris," Agr. Exp. Sta., Ithaca, N. Y., Mem. 167, *June* 1934, *C. F. Moreland.*

"Precautions to Observe in Making Crop-Acreage Reductions and Adjustments in North Carolina," Agr. Exp. Sta., State College Sta., Raleigh, N. C., Agron. Inform. Cir. 90, *Nov.* 1934, *C. B. Williams.*

"Experiments on Thinning Peaches," Agr. Exp. Sta., Wooster, Ohio, Bul. 541, *Oct.* 1934, *J. S. Shoemaker.*

"Cereal Hays for Ohio," Agr. Exp. Sta., Wooster, Ohio, Bul. 543, *Nov.* 1934, *L. E. Thatcher.*

"The Bimonthly Bulletin," Agr. Exp. Sta., Wooster, Ohio, Vol. 20, *No.* 172, *Jan.-Feb.* 1935.

"The Panhandle Bulletin," Panhandle Agr. Exp. Sta., Goodwell, Okla., No. 55, *Dec.* 1934, *Everett R. Clark.*

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"Sorghums for Forage and Grain in South Dakota," Agr. Exp. Sta., Brookings, S. D., Bul. 285, *Apr.* 1934, *A. N. Hume and Clifford Franzke.*

"Tomatoes in the Farm Garden," Agr. Exp. Sta., Knoxville, Tenn., Ext. Pub. 180 (*Rev. of Pub.* 148), *June* 1933, *W. C. Pelton.*

"Grapes in the Farm Garden," Agr. Exp. Sta., Knoxville, Tenn., Ext. Pub. 181, *June* 1933, *W. C. Pelton.*

"Korean Lespedeza," Agr. Exp. Sta., Knoxville, Tenn., Cir. 49 (*Rev. of Ext. Pub.* 172), *Oct.* 1934, *C. A. Mooers.*

"Summary Report of Progress July 1, 1932 *to June* 30, 1934," *Agr. Exp. Sta., Logan, Utah, Bul.* 250, *Sep.* 1934, *P. V. Cardon.*

"Crested Wheatgrass," U. S. D. A., Washington, D. C., Leaf. 104, *H. L. Westover.*

"Agronomic Evaluation Tests on Mechanical Blocking and Cross Cultivation of Sugar Beets," U. S. D. A., Washington, D. C., Cir. 316, *Aug.* 1934, *A. W. Skuderna, H. E. Brewbaker, C. E. Cormany, C. A. Lavis, S. B. Nuckols, Charles Price, F. R. Immer, J. O. Culbertson, G. W. Deming, and E. M. Mervine.*

"Potato Production in the South," U. S. D. A., Washington, D. C., Farmers' Bul. 1205 (*Rev.*) *Aug.* 1934, *William Stuart.*

"Flax-Fiber Production," U. S. D. A., Washington, D. C., Farmers' Bul. 1728, *July* 1934, *B. B. Robinson.*

"Alfalfa Varieties in the United States." U. S. D. A., Washington, D. C., Farmers' Bul. 1731, *Sep.* 1934, *H. L. Westover.*

"Report on the Agricultural Experiment Stations, 1933," *U. S. D. A., Washington, D. C., June* 1934, *J. T. Jardine and W. H. Beal.*

Economics

The attractive and well-set-up Bulletin 305 of the Pennsylvania State College, "Types of Farming in Pennsylvania," should adequately serve the purpose for which this research was undertaken. The authors, Emil Rauch-

enstein and F. P. Weaver, in their introduction state that the kind of farming in any area is the result of the experience of farmers in trying to adjust their business, mainly to topography, soil, climate, and price changes. "A study of these factors in relation to the systems of farming and practices followed over a period of years, therefore, may give a basis for judging, in a general way, what crops and livestock can be produced to best advantage, the proportions of each, and what shifts may be expected in the future with anticipated price changes. It may also give a basis for planning programs of research, extension, and development." This bulletin contains many hints of procedure which might be put to good use in formulating forward-looking programs in other regions.

"Economic Readjustment in the Dairy Industry in Delaware," Agr. Exp. Sta., Newark, Del., Bul. 190, June 1934, R. O. Bausman.

"Types of Farming in Idaho—Part 1—Agricultural Resources and Factors Affecting Their Use," Agr. Exp. Sta., Moscow, Idaho, Bul. 207, May 1934, Harold A. Vogel and Neil W. Johnson.

"The Place of Pasture in Iowa Farming," Agr. Exp. Sta., Ames, Iowa, Bul. 323, Oct. 1934, Edgar B. Hurd and H. L. Thomas.

"An Economic Study of Land Utilization in Montgomery County, 1932," Agr. Exp. Sta., Ithaca, N. Y., Bul. 613, June 1934, F. F. Hill and George T. Blanch.

"Ohio Agricultural Statistics 1933," Agr. Exp. Sta., Wooster, Ohio, Bul. 542, Nov. 1934, G. S. Ray, A. R. Tuttle, and P. P. Wallrabenstein.

"Farm Price of Cotton in Relation to Quality," Agr. Exp. Sta., Knoxville, Tenn., Bul. 153, Aug. 1934, C. E. Allred, G. H. Hatfield, and P. B. Boyer.

"The Mixed Carload in Distribution of Vegetables from the Lower Rio Grande Valley of Texas," Agr. Exp. Sta., College Sta., Tex., Bul. 497, Nov. 1934, W. E. Paulson.

"Virginia Farm Statistics 1934," Va. Dept. of Agr., Richmond, Va., Bul. 11, Oct. 1934, Henry M. Taylor.

"The Market for Mid-western Potatoes," Agr. Exp. Sta., Madison, Wis., Ext. Cir. 272, Nov. 1934, Henry H. Bakken.

"Market Distribution of Car-lot Shipments of Fruits and Vegetables in the United States," U. S. D. A., Washington, D. C., Tech. Bul. 445, Sep. 1934, J. W. Park.

"Cotton Production in Egypt," U. S. D. A., Washington, D. C., Tech. Bul. 451, Oct. 1934, P. K. Norris.

"Community Production of Acala Cotton in New Mexico," U. S. D. A., Washington, D. C., Cir. 314, June 1934, A. R. Leding.

"Items Relating to the Administration of the United States Cotton Standards and Cotton Futures Acts," U. S. D. A., Washington, D. C., Serv. & Regul. Announcements No. 10, Sep. 1934.

Potash Has Big Role

(*From page* 22)

supply of soil potash is the more quickly exhausted. When exhausted to the extent that the soil no longer supplies it fast enough, then the nitrogen and phosphorus become proportionately ineffective. The ultimate and only solution is to add potash to the nitrogen and phosphate combination, thus forming a complete fertilizer. This condition is already present in the older sections of the country, and the recognition of the need has been met by the increased use of potash. On the newer lands on the other hand, the need is not very urgent as yet.

The crop must be considered in thinking of plant-food needs. Legumes and the starch and sugar crops rank high in potash demands. Many of the common vegetables, because they grow so quickly, must have an abundance of easily and quickly available nutrients, which necessitates liberal fertilizing. The combination of quick growth and big yields make potash fertilizing the more urgent. The continuous production of crops which are sold off the farm hastens the time when a potash deficiency becomes a critical factor. Root crops are often much helped by potash. So important is this element to the root development of crops that the percentage of lodged corn has been re-

duced by its use. It stimulates stronger root growth and better root anchorage.

Quite recently potash has become noticeably effective in pasture improvement in the older grazing sections. Minerals generally are necessary to bring back clovers, and the use of potash on the grazing lands results almost invariably in more clover and a richer and more palatable grass mixture for animals. Potash increases succulence, and this no doubt is a factor in producing more palatable grazing.

Available Potash

There are few soils from which plants cannot obtain some potash. As the supply becomes more limited, the plant adjusts itself to obtain its nutrition from a dilute solution. But the degree of adjustment cannot extend beyond a certain limit. Before growth occurs, proteins must form; and before protein formation, there must be the production of carbohydrate. But carbohydrate cannot form except in proportion to the supply of potash, and therefore the growth rate may depend upon the rate of potash availability. In fact the functions of the various nutrients are so coordinated that a deficiency or slow rate of availability of any important one may render all the others nearly useless.

The amount of available potash in the soil fluctuates from time to time. That soluble in water is very readily available to all plants, and that soluble in weak acids has been found reasonably easily available to most plants. When the soluble portion is used up, it becomes a question of how quickly the reserve supply of the soil can be changed over to an available form.

Potash is conserved by saving and returning manure to the land and by using care to return straw and crop residues. The sale of cash crops may remove potash rapidly, especially the sale of hay and leafy vegetables which carry a great deal of it. Trees and fruits generally remove potash more slowly, but even then a deficiency may develop in time.

All of the common carriers of potash have proved highly satisfactory for general use. For special uses a particular form may be preferable. When tobacco is fertilized with muriate of potash, the chlorine sometimes impairs the burning quality of the leaf, in which case the sulphate is preferable. On a few soils such as some of the sands of Connecticut and the Carolinas, magnesium deficiency has limited crop production. This condition has been corrected by the use of potash salts, such as sulphate of potash-magnesia, which carry some magnesium. Stable manure, when available, also is a very satisfactory carrier of potash.

The rate of potash fertilizing varies a great deal with different soils and crops. In general the preference should be given to frequent moderate applications. The soil absorbs this plant-food element quite readily, and the loss by leaching is not large. The chief objection to heavier but less frequent applications is that plants "gorge" themselves with potash when it is abundant in easily available form, and thus do not use it most efficiently. The rate and frequency of application, however, must be modified to meet specific needs.

Interest Is Increasing

That interest in the use of potash is increasing is quite apparent. Advances in truck crop production have especially stimulated appreciation of the importance of thorough fertilizing. As agriculture becomes more highly specialized, fertilizers in general become more necessary. In producing crops of high acre-value, a fertile soil brought to its maximum production by wise use of fertilizers is a first essential to success. No fertilizer program can be quite complete if any one of the major plant nutrients is overlooked.

Better Cantaloupes

By George R. Cobb

Salisbury, Maryland

ALTHOUGH it is generally conceded that root crops are improved both in yield and quality by the use of high-potash fertilizers, the fact that vine crops also respond to liberal applications of potash in a similar manner is not so well known. According to Van Slyke, however, a crop of beets removes but 17.5 lbs. of nitrogen, 5 lbs. of phosphoric acid, and 32.5 lbs. of potash, whereas an average crop of cantaloupes (muskmelons) removes 22 lbs. of nitrogen, 8 lbs. of phosphoric acid, and *40 lbs. of potash.*

Vegetable growers in Florida, according to a bulletin from that state, apply 1,500 lbs. of a 4-8-8 fertilizer, and Voorhees advises a liberal application of a 4-8-10 mixture. Growers on the Del-Mar-Va Peninsula claim that potash develops a better "net" which is at once a sign of maturity and an indicator of quality, matures the crop earlier, and produces a crop of fruits much more uniform in size.

Check with Tests

As a check on these various claims several tests have been conducted, during recent years, in which high and low potash have been compared. In 1928 the plan of the plots was as follows: Plot 1 received 1,000 lbs. of 5-8-5; Plot 2, 1,000 lbs. of 5-8-5 plus 200 lbs. of muriate of potash applied between rows; Plot 3, 1,000 lbs. 5-8-5 plus 400 lbs. of muriate of potash.

The yields at harvest time showed a consistent and marked increase in favor of higher potash. Plot 1 produced 5,677 melons. Plot 2, 5,833 fruits; and Plot 3 yielded 7,146 melons —gains of 156 and 1,469 melons, respectively. In addition to the increased yields, due to the influence of higher potash, maturity was hastened and there was more uniformity in size and shape. The plot receiving the 400 lbs. of muriate matured its fruits and the ground was prepared and seeded to clover before harvesting was completed on Plot 1, which received no extra potash.

Verify Results

In 1929 the plan of the tests was changed somewhat, in that the extra potash was included in the mixed goods instead of being applied between the rows after the plants were starting to vine. Plot 1 received 1,000 lbs. of 5-8-5; Plot 2, 1,000 lbs. of a 5-8-10; and Plot 3, 1,000 lbs. of a 5-8-20 mixture.

The results in 1929 were similar to those secured in 1928, as a consistent increase in yield was shown as the potash content of the fertilizer was increased. The number of melons produced was 4,335, 4,411, and 5,310. Vines on Plot 3 showed more vigor and better color throughout the season. The fruits were more uniform in size, net, and shape at harvest time. Early maturity again was developed on the highest potash plot, and a test for sugar showed more sugar in fruits from the high-potash plots than in those from the plots receiving smaller amounts of potash.

As a result of these tests and subse-

quent tests, as well as results from actual farm practices, one of the large fertilizer manufacturing concerns on the Peninsula developed a 5-8-12 mixture for cantaloupes and other vine crops. Thus, the plan of tests for 1934 included a plot to which this newer analysis was applied in a comparison to the popular 5-8-5 mixture.

These 1934 tests were conducted on farms widely separated, but a report on two of them, one on the farm of Wilson Figgs, Seaford, Delaware, and the other on the farm of G. H. Richardson, Salisbury, Maryland, fully illustrate the results secured from farms of the entire series. For the benefit of those growers who think and talk in terms of bushels, hampers, crates, barrels, etc., one report will state yields in crates (carriers) while the other report will show the yield in individual melons.

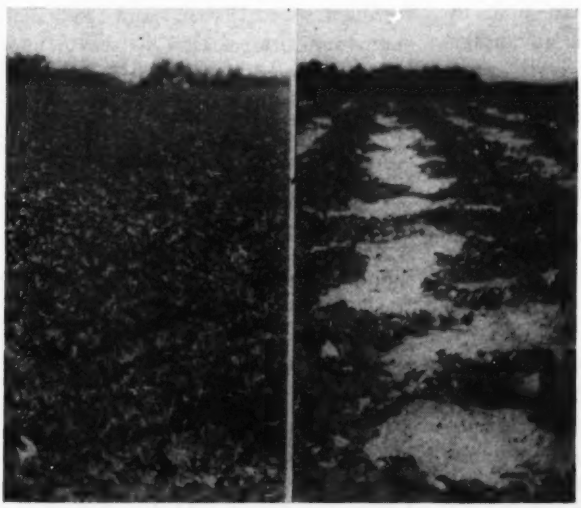
The plots were fertilized as follows: Plot 1 received 1,000 lbs. of a 5-8-5 commercial fertilizer mixture; Plot 2, 1,000 lbs. of the 5-8-5 plus 200 lbs. of muriate of potash; Plot 3, 1,000 lbs. of 5-8-12; and Plot 4, 1,000 lbs. of the same 5-8-12 plus 200 lbs. of muriate of potash. On the Figgs farm the 5-8-5 and 5-8-12 were applied in the row while the extra potash was spread broadcast. On the plots at the Richardson farm the extra potash was broadcast one month before the seed was sown and the 5-8-5 and the 5-8-12 were broadcast at time of planting.

Incidentally this practice of applying straight potash some time before the crop is planted or the seed sown, or a "pre-application," is very popular with truck growers in general. The growers feel that there is less danger of injury to the seed and that the potash is more readily available to the plants when pre-applied. Sweet potato growers in several sections of New Jersey, for example, apply 500 lbs. of muriate of potash per acre as early in the season as possible, which in most cases is during the winter months.

Although yields on all farms were cut by a rather prolonged dry spell, consistent and marked differences showed up in the figures, with increases developing as the potash supply was increased.

On the Figgs farm the plot receiving the 5-8-5 with no extra potash produced 4,540 melons, while Plot 2 which received the 200 lbs. of muriate in addition produced 5,312 melons, a gain of 772 melons. Corresponding plots on the farm of Mr. Richardson showed a yield of 112 crates (carriers) on Plot 1 and 124 crates on Plot 2, a gain of 12 crates or approximately 432 melons in favor of the extra potash.

Referring to the reports of these two tests, figures show that Plot 3 which received 1,000 lbs. of 5-8-12 produced 4,327 melons, whereas Plot 4 with the extra



Left: 1,000 lbs. of 5-8-12; note better vine growth and absence of exposed soil. Right: 1,000 lbs. 5-8-5; note exposed soil area and lack of vine growth. Farm of G. H. Richardson, Salisbury, Md.

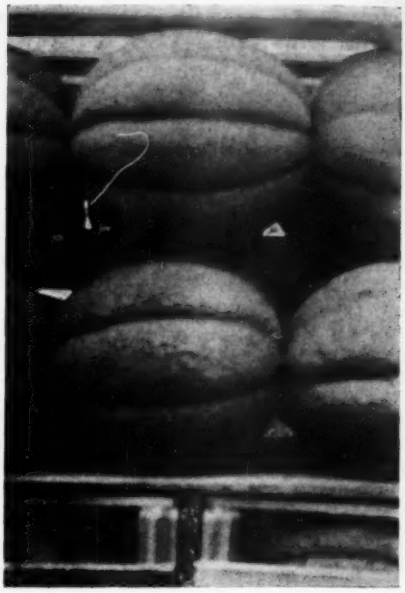
potash in the form of 200 lbs. of muriate yielded 4,972 fruits, a gain of 645 fruits. Reviewing the yields secured at the Figgs farm, it is noted that the 5-8-5 plot to which 200 lbs. of muriate of potash also were applied gave the largest yield, and it also is to be noted that this combination of fertilizers developed an analysis of about 5-8-15, which is rather a high-potash fertilizer for cantaloupes as compared with analyses now being used by the general run of growers.

A comparison of yields on the four plots at the Richardson farm shows a gain of 12 crates for Plot 2 which received the extra 200 lbs. of muriate, checked against Plot 1 which had only the regular 5-8-5 application. Plot 3 which received 1,000 lbs. of the 5-8-12 fertilizer produced 308 crates or a gain over Plots 1 and 2 of 12 and 184 crates respectively. Reduced to individual fruits these gains would be 432 and 6,624—rather a startling increase in favor of the higher potash mixture.

Potash Hastens Maturity

Daily harvesting records reveal that the high-potash plots were first in maturing their melons, an advantage in most seasons as the early crop usually brings higher prices than the mid-season crop. Again, the net on the melons from the high-potash plots was very prominent and not flat like the net on the melons from the low-potash plots.

Uniformity in size, a decided asset to the grower, is clearly displayed by the report from the Richardson farm as it shows that 240 crates of the 308 produced on the 5-8-12 plot were packed and shipped in only three different sized packages whereas it is not unusual for growers to purchase anywhere from 5 to 7 style crates of varying dimensions in order that their crop may be packed in the approved manner.



A close-up of primes from the Wilson Figgs farm, showing uniformity of type.

It is needless and almost useless, in an article of this nature or in a report issued to the public, to present the dollars and cents value of either costs, profits, or losses. As prices for fertilizer, seed, labor, and packages may vary from season to season and prices received for the product are rarely the same for two years in succession, it is evident that returns and costs during 1934 would rarely be the same for any other year.

However, a review of the data presented does show that vine crops respond to high applications of potash. It might be added that soil conditions as to acidity were favorable and that the soils were at least of moderate fertility. Total yields were lower than might have been the case had the crop received more rainfall, but it is doubtful that the differences in yield between crops would have shown a reversal or even would have varied a great deal in the comparative results.

Malting Barley

(*From page 9*)

sand loams undoubtedly are to be preferred, while heavy clay soils, light sands, and high humus soils are not suitable, particularly the latter two. Clay soils if in good tilth and well drained may produce good crops but are more susceptible to extremes of heat and moisture conditions.

Barley should follow either a cultivated crop such as corn or roots or a fall-plowed clover sod. Spring-plowed land is seldom satisfactory for barley in Ontario; neither is heavy manuring desirable as it tends to produce too much straw, thereby delaying maturity. Kernels produced under these conditions are usually improperly filled out and the protein content often is too high for good malt.

Most successful barley growers use some commercial fertilizers in which phosphorus and potash predominate. It is important that only small amounts of nitrogen be applied, not more than two or three per cent, or the same undesirable results may occur as in over-manuring. Phosphorus should be used in liberal amounts. It stimulates a more rapid root development and enables the plant to forage for itself more quickly. Potash should be applied in sufficient amounts to strengthen the straw and build up the all-essential starch of the kernel.

The Ontario Fertilizer Board recommends the use of 2-12-10 for producing barley for malting purposes, and this mixture has found favor with many of the best growers.

There are other mixtures which may suit specific conditions. For instance, if the soil is in a high state of fertility and too much straw growth is feared, the nitrogen may be omitted altogether and 0-12-15 or an 0-12-10 substituted. The rates usually recommended are from 250 pounds to 350 pounds per acre. The fertilizer should be applied at the time of seeding the barley and drilled in at about the same depth as the barley is planted.

Barley usually responds to the application of fertilizers, for it is a shallow-rooted plant as well as an early-maturing one. Consequently it requires its food supply in a quickly available form and within easy reach of the young roots. It must be emphasized that phosphorus and potash are the greatest needs of this crop in the development of stiff straw, plump kernels, and early maturity.

Not only is the growing of good malting barley an art, but the harvesting operations must be carried out with great care. The crop should not be cut until thoroughly ripe, for unlike wheat or oats the ripening processes cease almost as soon as it is cut.

The stooking of barley intended for the malting market deserves some special care. A great deal can be done in this step of the harvesting process to preserve the vitality and soundness of the grain by capping the stooks. Threshing is also important, and under no circumstances should the grain be broken or peeled by careless operation of the threshing machine.

Cucumbers

(*From page 20*)

the fruits were "better shaped and more uniform in size, color, and shape." Plot 1 with its 5-8-5 yielded 172 bushels, whereas Plot 3 produced 224 bushels.

Yields in Bushels, Primes

Grower	Plot 1	Plot 2	Plot 3	Plot 4
Mr. Moore	42	54	55	66
Mr. Toadvine	100	124	96	124
Mr. Hill	172*	144*	224*	228*

(* Total number of fruits produced)

The chief difference between the 5-8-5 and 5-8-12 mixtures was the more uniform shape and size of the cucumbers grown with the latter. Of the two methods of applying the fer-

tilizer in general practice, it appeared that extra potash broadcast, whether on the 5-8-5 or 5-8-12, was more effective than that applied in the row.

The results show very clearly that under the conditions of these tests more potash is needed for a high yield and high quality than is supplied by 1,000 lbs. of a 5-8-5 mixture. Whether this extra potash is applied in the mixed goods or as a separate application does not appear to be important.

Incidentally it might be added that results of the 5-8-12 mixture on cucumbers, cantaloupes, and watermelons have been so satisfying that both Maryland and Delaware, through their Agromomists and other officials, have adopted this analysis as one of the official analyses for recommendation to the growers of the two states.

Feed Southern Crops

(*From page 7*)

may become soluble in toxic proportions in the highly acid red and chocolate soils that contain relatively large amounts of these materials.

"In making liming and fertilizer recommendations for various soils, the probability of the presence of toxic amounts of such materials as manganese and iron in chocolate and red soils should be taken into consideration. Soil acidity as such may not be an important factor in the growth of crops over a relatively wide range of pH values, but it is the differential in the nutritional complexes in various soils which determines the growth of plants. In the gray Coastal Plains soil crops may be grown successfully at a relatively high degree of acidity on account of the very low content of such materials as manganese and iron to become soluble in toxic amounts. When such soils are limed heavily there may be a serious deficiency of manganese in the production of many crops."

2—Not *when* applied but *how much* applied seems the important consideration in feeding *potash* to the cotton plant. Results of comprehensive tests in South Carolina, in which all plots receive 600 pounds per acre of a 5-10-0 fertilizer before planting, with varying amounts of potash applied at different times, may be thus stated:

There does not seem to be a significant difference in yield from the various times of applying potash fertilizer with the lower rates of application. However, when as much as 45 to 75 pounds of potash per acre are applied, it is often desirable to apply some of the potash before the crop is planted or as a top-dressing.

These data suggest that for the rates used under the conditions prevailing on many farms, one might expect the addition of one pound of potash to increase the yield 8 *to* 15 *pounds of seed cotton.*

There has been an unusual amount of rust, or potash deficiency, in the cotton crop in the southeastern section of South Carolina. The early loss of the leaves of the cotton plants prevents a large proportion of the bolls from developing properly. The bolls produced on plants grown on soils deficient in available potash do not open normally, and the cotton is often difficult to pick. Potash deficiency in cotton is often serious during a relatively dry growing season, particularly following a relatively dry winter. These conditions prevailed in the southeastern section of the state for the past two crop seasons, and this is very probably one of the important reasons for the acute potash deficiency

Tobacco leaf (left) low in sulfur, compared with normal leaf (right).

in cotton observed in such a large proportion of the crops in 1934.

3—Suggesting the use of dolomitic limestone as a filler to neutralize equivalent acidity of materials used in mixed fertilizers, Southern agronomists call attention to the fact that a heavy application of lime material may reduce the availability of potash in the soil. On this point Dr. Cooper says:

"This effect is often observed in the cotton crop following such crops as alfalfa where the soil is limed heavily. Where cotton follows alfalfa it is often necessary to make a heavy application of potash fertilizer materials to the soil to prevent serious injury from potash deficiency or cotton rust."

The presence of the cotton boll-weevil makes it impracticable to grow cotton on low, moist land which produces a tall cotton plant with an abundance of leaves, and these low, moist areas are now being used largely for grain and legume hay. But much of this potentially good corn and hay land is deficient in available potash because not usually fertilized with a complete fertilizer mixture containing potash.

The common impression that corn and legume crops do not respond to potash probably results from data on rotation and fertilizer experiments where these crops are included in a rotation in which cotton is liberally fertilized with potash. It is true that where sufficient potash has been used for cotton in such rotations there is sufficient available potash left in the soil for several corn and hay crops. This is not true, the results show, when corn and hay crops are grown continuously, and the potash deficiency results in corn root rots and other ailments.

The common field crops, besides cotton, affected by potash deficiency are soybeans, cowpeas, corn, and oats. Cotton yields are the first to be seriously reduced by potash deficiency. Cotton is followed by soybeans and cowpeas. Oats are much more resistant than corn. One of the first symptoms observed in the oat crop is weak straw and serious lodging, or plants falling down before maturity.

On the basis of reports of vegetable crop failures the South Carolina Experiment Station has been making some fertility tests with cucumbers, squash, cantaloupes, and watermelons.

The soil samples collected from areas which do not produce satisfactory crops of cucumbers and squash are often very strongly acid. Recent tests show that these crops may give a

marked response to an application of lime materials. Basic slag seems to produce cucumbers with a dark green color, which is often a highly desirable characteristic. Taking the yield of the plots receiving 4-8-8 fertilizer and unlimed as 100 per cent, the basic slag and limed plots produced 148 and 123 per cent, respectively, of the unlimed plots. The yields on the plots which did not receive potash were very low.

The yields of the squash on the plots receiving basic slag and lime were 245 and 205 per cent, respectively, of the unlimed plots. These data suggest the reason for almost complete failure of these crops on certain strongly acid soils.

Cantaloupes also showed a marked response to an application of lime and basic slag. This crop is not successful on strongly acid soils.

The results secured with watermelons show that there was very little response to lime materials, but there was a marked response to potash fertilizer.

Youthful Soilsmen

(*From page* 21)

tested them for acidity. The result of this testing was summarized in tabular form for permanent record along with the drawings of each field which showed the location from where the soil sample was taken.

Three of the boys enrolled in the classes do not live on farms. They each made an enlarged drawing of our township from a county map and brought it up to date by changing the names to conform with present owners of the land. As the acidity testing, soil testing, and fertility programs develop these township maps will be colored to indicate the extent of the soil improvement project in the township.

The Agricultural and Scientific Bureau of the N. V. Potash Export My., Inc., Lafayette, Indiana, cooperated with us by furnishing mimeographed directions for conducting class experiments in determining soil plant-food needs. This company and the local Farm Bureau store supplied fertilizer for carrying on the experiment and samples of soil which were representative of entire fields were carefully prepared by members of the class. Class time was allowed for the experiment on samples from fields to be planted to wheat and corn in 1935, but the other crops that were to be grown were tried out during the students' spare time at home after two successful experiments had been performed at school under supervision.

Reviewed by Fathers

When the tests were ready for reading, we invited the Fathers in for the class period. In general the effect noted was that the lighter soils seemed to do better in the pots containing nitrogen, Potash showed decided advantages on the darker soils, while the complete fertilizer treatment resulted in larger growth in almost every test.

This work proved so interesting that one Senior enrolled in Farm Management quit one of his academic studies at the end of the first semester in order to repeat his Soils and Crops work, since this experimenting had not been carried out when he took the course.

The boys of the Farm Management class used their maps in a study of field reorganization. One project is

now under way in which a five-field arrangement will gradually become a four-field farm which will fit the rotation better, have fewer angling sides, point rows, and end posts to bother with. The present time seems to be advantageous for this study because of the need for replacing many farm fences during the next few years.

A study of the soil conditions of each farm is bringing out the fact that certain portions of the acreage is unadapted to economic crop production. One of the developments that is coming from the study will be plans for a conservation project. Trees and grassland will gradually stop the erosion that has been allowed to go unchecked for many years.

Pioneering in Corn

(*From page* 14)

bushels per acre was the result. In 1931 they tried several more hybrids with slightly better success. These failures did not quench the fire of their determination. They had been told that there was no magic assurance that a hybrid was a superior type of corn. They understood that it was a problem of obtaining a strain of corn that would respond better under their conditions than their home-grown strain.

Three years ago they were able to obtain seed of a locally grown Indiana hybrid corn, Hoosier Hybrid. This corn rather offended Mr. Bailey's ideas of beauty in corn, but it was a better adapted strain with a shorter growing season. They were able to plant it two or three weeks later, thus permitting the sweet clover or rye to begin decomposition. They could plow the land, work it down, and permit the weeds to start growth. A thorough discing just before planting destroyed these little weed plants and made the problem of subsequent weed control much easier.

The Hoosier Hybrid clicked, as is shown by the mounting yields of the past three years. They gained the coveted goal with yields of 105 bushels, 113 bushels, and 128 bushels. Another significant fact is that their corn made No. 2 grade when husked in the middle of October, something unheard of in this territory so early in the year, and this corn would shell without a wrestling match. "More good feed in less space, and the water was left in the field instead of damming it up in the crib," remarked James Bailey.

These experiences add just one more grain to the mountain of evidence that corn root rot is a disease of improperly nourished plants. They show the value of proper fertility practices because these men previous to about 1930 had been using phosphate and nitrate, but without the proper amounts of potash. The stalk symptoms revealed the lack of potash balance and when this was corrected the corn responded quite satisfactorily.

In this case Hoosier Hybrid was apparently much better suited to the conditions than the large Reid. Naturally, this does not mean that Hoosier Hybrid is always best. As a matter of fact, Mr. Bailey each year is trying more new hybrids and searching for one which will do even better on his farm than Hoosier Hybrid. It does prove, however, that when corn shows the effects of root and stalk rot, part of the trouble may be an unadapted strain. The undaunted pioneer spirit of these Indiana farmers and their willingness to be guided by the scales and gains of their livestock are leading them to the top.

Pasture Must Carry Cow Per Acre

(*From page* 17)

have been secured in many pastures, comparing the cost of the increased dry matter and protein with its cost in commercial feeds of equivalent value, and find that on reasonably good sods, especially where they contain white Dutch clover, the cost of the increase is from one-fifth to one-half what the feed costs in other forms. This leaves little or no room for doubt as to the practicability of top-dressing.

Up to the Farmer

The questions a farmer has to decide in his own case are whether he needs more feed during the pasture season, whether he has any pasture that is worthy of being top-dressed, and if so, what materials he should use and in what amounts.

It is only rarely that a farmer does not need a greater volume of pasture grass during the summer season than he now has. Even if there is enough feed for May and June, there is the short season of July and August to be considered. Stimulating the clover growth with a prior application of phosphorus and potash will go far toward tiding the herd over these normally lean pasture months.

The increase in feeding value of the grass and clover due to judicious fertilization is also a factor that should not be overlooked. In our trials, fertilization has produced an average of about 3% more protein in the pasture forage, making it a better balanced ration for the cows so that less grain is required.

If the normal amount of fall pasture, from September on, is not sufficient, an application of nitrogen in mid-August before fall rains start will do much to supply any deficit of feed from then on. Producing more pasture when it is actually needed is possible in a great majority of cases.

The better sections of the pasture should be top-dressed first. Here the greatest increase will be secured. If these portions are regular in shape and lend themselves to fencing for judicious grazing, the situation is ideal. Many farms have two or more pastures anyway, and these can be kept separate to attain the end of rotation grazing. No matter if the better areas are not regular, when the pasture is already divided.

The amount of fertilizer to be used will depend on two factors. The density of the sod is one of these. The better the sod, the more fertilizer can be used with profit. The needs of the herd and the area to be treated also will govern the rate of top-dressing. Speaking generally, the lower the rate of fertilizing, the greater will be the returns per dollar invested. In our trials where fertilizers have been used at different levels or rates, the returns for 25 lbs. of nitrogen as against 50 lbs. or a double application have been in the proportion of 6 to 10. In other words, the first 25 lbs. of nitrogen represented by 160 lbs. nitrate of soda or its equivalent is about 50% more effective than the second 25 lbs. on the same sod.

Frequency of Application

When a high rate of return is desired, the first application may approximate 300 lbs. of an 8-16-16 fertilizer. If this stimulates the Dutch clover to a profitable point and fills in the July-August period satisfactorily, it may be repeated year after year. Where no Dutch clover responds to the minerals in this treatment, nitrogen alone should be used at least for a year or two thereafter. Where grass greatly exceeds the clover in the stand, a 1-1-1 ratio such as an 8-6-6 or a 7-6-6 may be used instead.

If no extra feed is needed in May

and June, the Dutch clover pasture may be treated with a phosphorus-potash mixture. One farmer in New Hampshire with a large area of Dutch clover pasture has satisfactorily met the needs of his herd by this treatment. The mixture used was 300 lbs. of superphosphate and 100 lbs. of muriate of potash per acre. Where the acreage is ample, this treatment should last two years before it is necessary to repeat the application.

The amounts of fertilizer mentioned may be scaled up or down depending on the pasture needs and the type and thickness of the stand.

Fortunate is the farmer who still has pastures that are good enough to be top-dressed. The trend is for pastures to deteriorate due to heavy grazing and to lack of attention to the principles of soil fertility such as are practiced on the tillage land. If there is no pasture area on the farm that is worth top-dressing, then it would be an excellent idea to establish one, either by reseeding some of the permanent pasture where feasible or by using a mowing field for pasture, and thereafter applying cheap fertilizers to augment the feed normally produced.

The Inquiring Mind

(*From page* 12)

science. He is also a "starred" member in *American Men of Science;* a fellow of the American Association for the Advancement of Science; and a member of the German and American Societies of Chemists; the National Geographic Society; American Society of Agronomy; American Soil Survey Association; American Peat Society; International Society of Soil Science; American Agricultural History Society; Minnesota Historic Society; Soils Commission; National Research Council; Swedish Peat Society; Sigma Xi and Alpha Zeta. He was vice-president of the American Chemical Society in 1907, and president of the Soil Survey Association in 1923.

Dr. Gortner has already been mentioned as a distinguished student of Dr. Alway's in the small classes at Nebraska Wesleyan University. From them also went forth other well-known chemists including Dr. W. D. Bonner, head of the Department of Chemistry of Utah; Associate Professor C. E. Vail of Colorado Agricultural College; Ellery Files, production manager of the Duratex Manufacturing Co., Newark, N. J.; and R. M. Pinckney, until recently with Dr. Alway in the Soils Division of the Minnesota Experiment Station.

Dr. Alway's early interest in soil studies was no doubt stimulated by the fact that when he was with the University of Nebraska the Santa Fe Railroad Company invited him to help in summer field investigations on dry soils in New Mexico and Arizona. While in Nebraska he also mapped out a program for the study of the soils of the state. It included tests of the effects of cultivation, by comparison of untilled native soils with those which had been worked and cropped. He was also a pioneer in the study of the movements of soil water.

His study of bleached flour in Nebraska in 1907 showed that it could with certainty be distinguished from an unbleached flour, and the kind of agent employed identified as nitrogen peroxide or halogen (chlorine or bromine). The quantity used might be estimated from the amount of certain reaction products remaining in the flour. From his research on that subject he concluded that the use of nitrogen peroxide in the quantities employed by the mills in Nebraska whitened the high-grade flour and

the bread made from it without affecting its composition, odor, taste, texture, or weight and without adding any substance in sufficient quantities to be injurious.

With Dr. W. L. Hadlock, while in Nebraska, Dr. Alway also analyzed samples from both the strongest and weakest bones from the hogs used in a feeding test, to determine whether any change in the composition of the bone ash accompanies the change in the percentage of mineral matter and in the strength of the bones. The result was that both lots of bones showed practically the same composition, thus indicating that the nature of the feed has no effect upon the relative proportions of the different constituents of the mineral matter of bones.

Problems Were Varied

When he began work in Minnesota, Dr. Alway found very different conditions existent in the soils of this state. Those of Nebraska were largely uniform in type, while those of Minnesota were of many different kinds. The great area of peat was a novelty to him and challenged his attention. Soon the Legislature made an appropriation for the special study of the peat and sandy areas in Anoka county, just north of Minneapolis, and the result of the research work done there attracted wide attention. Dr. Alway and his associates demonstrated there that by liming sandy soils the farmers could grow profitable crops of alfalfa. Then they prescribed cultivation methods and discovered marl beds in adjacent swamp lands as a source of needed lime. The result was that the dairy industry in Anoka county took on a new lease of life and became more wide-spread and profitable.

Study of the peat soils showed drainage to be the first essential step in reclamation. Burning of such soils, sometimes done, might prove an extremely dangerous procedure. Use of heavy rollers was found highly beneficial and action of tractors also helped to compact peat soils. A coating of sand or clay was found to materially lessen the danger of summer frosts. Then, too, it was proved that the success of reclamation largely depended upon the application of potash or phosphate, or both together, and in some cases of nitrogen as well as lime. Stable manure, which furnishes nitrogen as well as potash and phosphate, was valuable on peat soils, but usually could be more profitably applied to mineral soils.

Applications of mineral soil or straw also improved peat land. The use of peat litter in stables was advised. Tamarack and spruce were found growing on most of the peat land, but the trees usually were too dwarfed to furnish merchantable timber. Where merchantable timber was found on bogs, it was advised that proper forest management should be practiced, without applying the entire program of reclamation.

Determined Plant Needs

Dr. Alway further determined that the unproductivity of the high, grass and sedge-covered bogs of northwestern Minnesota is due to a lack of available phosphate, and that when phosphate is not applied, flax alone, of all crops tried, has given satisfactory yields. Liming was found prerequisite to the growing of alfalfa on the older soils of the southern counties of the state, and farmers were advised that as high yields can be secured after proper liming as on the younger soils of the West. On limed land inoculation was prescribed. The use of artificial cultures proved as effective as heavy applications of soil from an established field of alfalfa or sweet clover; but on unlimed land the soil transfer methods proved far more effective, in the case of the first seeding of alfalfa.

On sandy soils, top-dressed with soil from an established alfalfa or sweet clover field, alfalfa could be grown without applying lime; but as a general rule liming increased the yields more or less even on satisfactorily in-

oculated land. In Dr. Alway's opinion, however, the increase actually due to liming, independent of its influence on inoculation, may be too small to be profitable, and during a drought the beneficial effect might be entirely masked. He made the striking remark that, "Liming experiments in which the current pure-culture methods of inoculation are relied upon, are likely to lead to very erroneous conclusions as to the economy of liming sandy soils for alfalfa."

Another of Dr. Alway's interesting conclusions is that the determination of the sulphur content of alfalfa provides a means of detecting the localities and even the particular farms where sulphur fertilizers are most likely to prove valuable. He also advises that on a large proportion of those soils in the west-central part of Minnesota upon which grain has long been grown without the application of manure, the use of superphosphate may be found highly profitable with wheat and clover on the fields which do not receive an application of manure every 3 to 5 years.

Recently he has been directing his attention to the erosion problem with the result that remedial and preventive measures are now in progress.

While Dr. Alway is an indefatigable worker, he is too, a most genial, humorous host and an inspiring conversationalist. The chief pleasure and joy of his life, apart from his work, is centered in his most interesting family. He is a churchman, being a member of the University Baptist Church, just across University Avenue from the Main Campus of the University of Minnesota.

Still Searching

Secluded in his basement den, he has delved deeply into agricultural literature and thought and dreamed of that "something" chemists hope to discover; but we fear his work has been his only recreation. He has no fads or hobbies, nor do we hear that he engages in any kind of play. That is to be deplored, for as the years pass, vital forces lessen and an all-work program must inevitably wreck one's physique. He is highly regarded by all of the members of the staff of the University, and we are sure that they and his hosts of farmer friends would like to see him, from now on, put on the brakes, "slow up" a bit, and seek relaxation and recuperation, that his admirable services may be prolonged.

It would, indeed, be well for all closely confined and overworked research men to remember Dryden's advice:

"Better to hunt in fields for health unbought
Than fee the doctor for a nauseous draught;
The wise for cure on exercise depend,
God never made his work for man to mend."

"Go to Grass"

(*From page* 4)

seepage and torrent waters into harsh and sticky clays, quick to bake and burn dry, or even swept clean to the bed-rock of barreness.

Tests on a gently sloping field in Missouri gave such a startling glimpse of the graphic effect of erosion on cultivated land compared to bluegrass sod that it bears re-emphasis. The problem was to estimate how many years it would take at the current rate of run-off to remove seven inches of topsoil, and with it, the most vital soil elements. On a plot cultivated four inches in the spring and summer fallowed, the seven-inch layer would be gone in 24 years. On a plot seeded to bluegrass well-established, the

same amount of topsoil removal would take more than 3,000 years.

If such community evils occur in the form of pests, the interest of public welfare demands that private will be submerged to the general good. Erosion knows no land boundary of title or deed. Once started, it leaps its greedy path across entire townships, slower than fire or flood, but just as destructive in the end. But private rights under the constitution prevent or delay proper safeguards taken by the public authority to halt erosion.

Some of the submarginal areas thus denuded of original value may best be salvaged for the future use of the nation by withdrawal through State or Federal agencies. There yet remain, however, many millions of acres of damaged land or land headed for ruin which may yet be saved by educational processes, perhaps reinforced by the natural back-to-grass effect of adjustment programs now made more appealing than through mere lessons or demonstrations. If the Government pays a man to rest his rented acres from some cash crop and he seeds it down, he unconsciously takes part in a worthy and economic enterprise. Man seldom fails to plant his land to something, and his energy is boundless. But good use may be put to that effort by a process of "going to grass."

MY honest friends, the dairymen, however, take this theory with a barrel of salt. All they can see in the grass revival is mush and milk for them and much more milk for the rest of the farmers. They have bad dreams of five-cent cheese and ten-cent butterfat. They have visions of Kansas cows knee deep in clover and Arizona heifers begging to be pailed. In thus drawing hard on an overworked imagination, the dairymen forget the old attitude they held toward the easy-going graziers, or their own trials and tribulations with alfalfa and mixed seedings. They also forget the absence of silos in remote ranges and the higher prices for pork and beef.

My own dairymen used to say that the lazy beef raisers did not get their living from the honest sweat of their brows, but merely sat around while the grass stooled out into sirloins. Grieved by the inertia of the beef and sheep herders, the milk producers with registered surplus kine for sale tried hard to convert their erring Western brethren by running demonstration trains or inviting scouts to enter the

promised land to study the diversified way peculiar to dairy regions.

Meanwhile, some dairymen were probably as guilty of overworking themselves and families as the beef or sheep grazier was of taking things comparatively easy. The dairyman, as a matter of fact, did *not* depend on pastures, although he might often have done so with better systems of management. He often used cultivated crops and seeded grain to the limit, often on land subject to erosion. He often thereby bent the backs of his family, destroyed his land, and burned out his cows with heavy protein-stuffing methods. He often rushed his cows to watery pastures in April and cussed the white grubs and the slim picking in July. If competition forces the milk farmer to do nothing more valuable than to improve his native pastures and study the seeding

and fertilizing of mixed plant meadows, it will have done him and the nation a lasting favor.

Undirected and unaided pastures are like a waif of the farm plant family, fed sparingly on left-overs and then expected to perform miracles. Worn-out and abandoned meadows, or wastelands invaded by hardy weed-like growth, form no small part of the so-called pastures of this proud agricultural empire. Farmers will commonly invest borrowed sums on glorified wonderberries and magnified oats, and hardly give a thought or spend a farthing on seed renewal and fertilizer for pastures, expecting to obtain the rich, ripe succulence and vitamins of June-time without any measure of return. Pastures have been taken for granted in this country whereas in England and Germany the science of grass management, like the conservation of forests, has been a prime objective in agrarian life.

A FIRM, compact seed-bed, with light covering, careful nursing of the weak sprouts, level terracing on hilly slopes, clipping of weeds, and judicious initial grazing are paramount steps in establishing a new permanent pasture.

Owing to the common indifference exhibited toward pastures, comparatively little experimental data have been accumulated to show the proper rate of application of fertilizing elements on a paying basis. Here and there plot tests have been run, but nothing really extensive enough to indicate the wide-spread returns which could be realized. But during the next few seasons, if I am not mistaken, we shall witness a series of major trials in this regard by practical farmers and county agents. Too little thought has been given to chemical restoration of soils devoted to pasture growth, and it is a topic worthy the attention of associations such as herd improvement units, now spending more time in balancing barn rations than in fitting the natural soil laboratory for the best of all nutrients—good pasture.

It is also imperative that expensive preparation be not wasted on extremely weak soils in these pasture tests. It is not fair to use the poorest areas of the farm for pasture and then expect fertilizer and reseeding to render high returns. Calcium, phosphorous, and potassium must be put on before the greatest response can be obtained from the great green-promoting element, nitrogen. Legumes or manure, when available in quantities, may prove to be the most economical nitrogen source. Only local trial and error prove the proper management, and hence any technical exposition is out of place. But one sure thing stands out in using fertilizer—the interloping weed crop will be much reduced, if not eliminated.

THERE are little tricks about pasture management. One of these relates to shade-tree location. Pastures with a grove or clump of trees on a hillside or hilltop bring about a wider distribution of the manure elements than pastures having willow trees lining a creek or pond. It is hardly vital to analyze the reason. Gravity should be used to spread the nutrients from manure into the grass roots rather than to let it seep and wash away down stream.

Up in our humid sections forest growth is the climax of vegetative life. Here trampling and close grazing together with compact turf and sunlight reaching to the crowns of the plants aid them to resist the encroaching brush and threatening trees. Used to storing reserves of plant food in subterranean parts, the humid grasses withstand fairly continuous grazing, if not pushed too far.

On the contrary, down in the semi-arid areas of this wide land, grasses of a kind common to that clime seem to be paramount over shrub and tree growth. Yet they do not possess the fighting habits of the humid grasses because they have been so long the

conquerors themselves. Here the reverse is true of heavy grazing. It may despoil a pasture in one season.

There is yet another piece of pasture robbery worthy of recital. Fat-stock men and milkers often are guilty of it. By stable or dry-lot management with little open range, except in periods of feed scarcity, the pasture is filched of its nutrients for the sake of the corn and grain crops, which get the manure.

GRASS freshly chewed and digested contains the sun-enrichened vitamins so often absent in cured forage, devoid of carotene. Although certain mineral deficiencies occasionally perplex the man depending on native pastures so that the herds get thin and fail to reproduce normally, it is generally true that nothing under the sun beats the mysterious elements found in the lush season.

If man would spend less time doctoring around with synthetic substitutes for native grasses in his husbandry, I am certain the fatness and the pigmentation of our lowly herds would exceed any produced by artificial means. By almost every token we can find to spur us on toward kinder consideration of our farm welfare, no single thing is more sure to bring reward and satisfaction than careful and timely attention to pastures.

There are still two further points to note in considering the need for pasture provisions. First, the technical advances of our times, the improved machinery and fertilizers, and the finding of newer strains of adaptable plants, all point to a wider difference in the cost of operating the more desirable and the less desirable farm lands. The less desirable areas may be expected to retire for the time and be conserved, we trust, for a possible future need.

The multiplied power of man to get returns per acre is the second point. Relatively fewer farm operators and possibly relatively less acres of good land are now required per capita than in pioneer days. Here again a process of retirement appears inevitable. Such extra acres also may in due time be sadly needed. They must be conserved for the coming generation. Science will find new ways to use them.

Meanwhile, what better way can be found to keep the top-soil intact and the physical and chemical values reserved than to maintain excellent turf? Some, to be sure, will call for forests and others for recreational use; but by and large the conservation of permanent pasture sod is the surest way to put land into title and trust estate against the day ahead when its wealth and resources may be tapped for cultivated crops or grain.

ON the whole, then, we may forget the taunts of "hayseedism" and the jibes of "going to grass." Our brave forefathers trekked across weary mileage to seek what in their day were precious and priceless values—water, timber, and grass. Some of us care little for water, either for sanitation or refreshment, and in many seasons it is mighty scarce. Our timber supply has followed the sad fading trail of the pigeon and the buffalo, a victim of listless national policies and narrow greed. Here and there we still have grass, such as it is, perhaps a little spindling betimes and scattered, but sticking with us to the last ditch. We may yet mend our ways and seize the chance to conserve that foundation-value of the earth, even if all else has been squandered.

So here's all the power of chemistry, chlorophyll, photosynthesis, and horse sense! May they be yours for 1935 to produce such pastures and meadows the like of which no man hath seen on your quarter-section since the Government yielded the deed. It's better for the flocks to graze than for you to grub anyhow!

CURIOSITY

The church service was proceeding successfully when a woman in the gallery got so interested that she leaned out too far and fell over the railing. Her dress caught in a chandelier, and she was suspended in mid-air. The minister noticed her undignified position and thundered at the congregation:

"Any person who turns around will be struck stone blind."

A man, whose curiosity was getting the better of him, turned to his companion and said, "I'm going to risk one eye."

Collector (at door): "At this time of the year we provide a free dinner for the poor and needy."

Harassed Householder: "Thanks very much. I'll just get my hat and coat and come along at once."

LOOKED DANGEROUS

Bing: "What do you mean kicking my dog? He don't even bite."

Bang: "Yes, but he raised his leg, and I thought he was going to kick me."

"Are you secretly married to her?"

"No, she knows it."

Lady of the House: "Why don't you get a job? Don't you know a rolling stone gathers no moss?"

Tramp: "Madam, not to evade your question at all, but merely to obtain information, may I ask of what practical utility is moss to a man in my condition?"

Old Maid: "Has the canary had its bath yet?"

Servant: "Yes, ma'am. You can come in now."

IT DEPENDS

Fred—"Her niece is rather good looking."

Ted—"Don't say Knees is, say Knees are."

Ikey: "Oy, Oy, I'm dying. Send for a priest quick."

Abie: "Vat, Ikey, you don't want a priest—you want a rabbi."

Ikey: "I should give the rabbi the smallpox—send for the priest."

"That child doesn't get his temper from me."

Husband: "No, there's none of yours missing."

CURIOSITY

The butcher was rather surprised when a slim young woman entered the shop and asked for twenty-five pounds of beef. All the same, he cut off the joint and put it on the scales.

"Will you take it with you, or shall I send it to your house?" he asked.

"Oh," she murmured, blushing prettily, "I don't want to buy it. You see, the doctor said I had lost twenty-five pounds, and I wanted to see what it looked like in a lump."

Before marriage a man declares he will be master of his home or know the reason why. After marriage he knows the reason why.

NV POTASH PREVENTS RUST, helps control Wilt and produces vigorous, healthy cotton plants, with less shedding, larger bolls that are easier to pick, and better yields of uniform, high-quality lint. But, you must make sure you use enough **NV** POTASH. The average cotton fertilizer, used in the past, does not contain sufficient **NV** POTASH to prevent extreme potash starvation, commonly known as RUST.

If you have been using fertilizer containing only 3 or 4% potash, ask your fertilizer man about the small extra cost of a similar mixture containing 8 to 10% potash. Figured in terms of an acre the cost is so small that only a few extra pounds of seed cotton will be needed to pay the difference. Yet thousands of farmers have found that extra **NV** POTASH pays for itself many times over in extra yields. It helps you get greater benefits from the other elements in your fertilizer.

It will pay you to select and use the fertilizer that is well-balanced with 8 to 10% **NV** POTASH. Where RUST was very severe it will also pay you to top-dress, when you chop out, with 200 pounds of **NV** High-grade 20% Kainit, or 100 pounds of **NV** 50% Muriate of Potash per acre. **NV** POTASH PAYS!

Cotton *never* Rusts

WHEN WELL-FED WITH

POTASH PAYS · NV · POTASH EXPORT MY. · ON ALL CROPS

POTASH

When you buy straight potash or potash in mixed fertilizer, it pays to make sure you get genuine **NV** *POTASH—the same potash that has helped Southern farmers to produce bigger yields of better quality crops for 50 years.*

N. V. POTASH EXPORT MY., Inc., Hurt Bldg., Atlanta, Ga.

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